Ten-Year Site Plan

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Content of the TYSP

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A. Executive Summary

This Ten-Year Site Plan (TYSP) describes the DOE facilities at the Princeton Plasma Physics Laboratory (PPPL) in terms of how they support current programs and the changes needed to support programs that are planned for the future. This plan covers the fiscal years 2009 through 2018 and includes data for FY 2006 (actual), 2007 and 2008.

This comprehensive plan addresses how PPPL's real property assets will support and implement the objectives of the Department of Energy Strategic Plan, the Energy Policy Act, the American Competitiveness Initiative, and the DOE Office of Science report "Facilities for the Future: A Twenty-Year Outlook". This Plan is developed in accordance with the Real Property Asset Management (RPAM) Order, DOE 0 430.1B and DOE-SC guidance. It is consistent with the Integrated Facilities and Infrastructure (IFI) crosscut budget and the annual budget submission. The plan integrates components of land use, facilities and infrastructure acquisition, maintenance, recapitalization, safety and security, and disposition plans into a comprehensive site-wide management plan. Development of this plan included assessment of past performance and projected future outcomes, and has strengthened communication and accountability among projects, infrastructure support and technical infrastructure.

The American Competitiveness Initiative (ACI) doubles funding for innovation-enabling research at key Federal agencies over ten years to support high-leverage fields of physical science and engineering, which include the Department of Energy's Office of Science. One of the goals of the ACI is to improve the capacity, maintenance and operations of DOE labs.[1]

The Energy Policy Act requires the development and implementation of a strategy for Facilities & Infrastructure at the DOE Laboratories. The strategy must provide cost-effective means for:

- maintaining existing facilities,
- closing unneeded facilities,
- making facility modifications, and
- building new facilities.

This TYSP provides the Princeton Plasma Physics Laboratory's strategic map that outlines the plans and funding for high leverage improvements that address these objectives of the Energy Policy Act and that will allow PPPL to attain the goal of the American Competitiveness Initiative.

The goal of the facilities plan is to provide first class facilities that enable first class science. The major need is for more modern reliable facilities. A phased and steady pursuit of this goal is necessary in order prepare our facilities and do it within realistic budget scenarios. The size of the PPPL site and the number of facilities provide adequate space and the staff size will remain relatively constant in the near term. The focus of the facilities plan must, and has been, on the persistent refurbishment, modernization, and conversion of several existing buildings so that we can provide facilities that are suited to current and planned R&D activities.

[1] p. 2, American Competitiveness Initiative, Domestic Policy Council, Office of Science and Technology Policy, February 2006

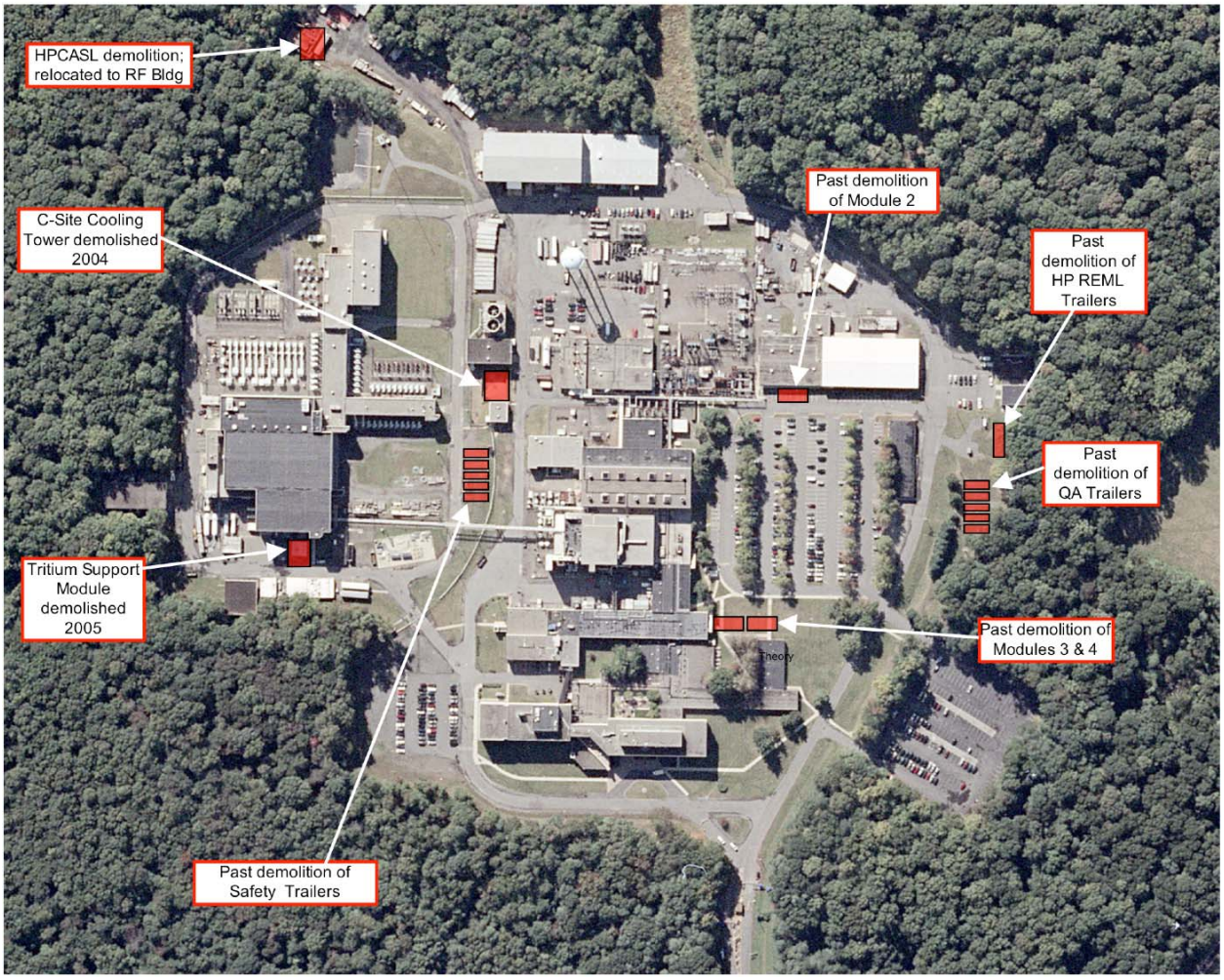
In support of the PPPL mission, important improvements and maintenance activities are planned and underway to buildings, shops, storage areas and offices. The Office of Science and PPPL goal of reducing deferred maintenance is being accomplished by efficiently planning maintenance activities, increasing the percentage of funds spent on maintenance, and dedicating funds specifically to reducing the maintenance backlog.

Although progress is being made in reducing maintenance backlogs, flat GPP and programmatic funding places an added strain on programmatic missions and does not permit desired infrastructure modernization. Without increases in programmatic funding, meeting the goal of expending 2% of RPV for maintenance costs results in funding to be diverted from programmatic missions. PPPL has implemented cost reductions and efficiencies and we are planning others. These efforts need to be combined with the forecast restoration of Science Laboratory Infrastructure (SLI) funding (beginning in FY09) for PPPL to fully meet infrastructure goals and to modernize. Should budgets be limited over the next several years, the infrastructure goal will be to keep up with repairs, critical maintenance, and modest renovation of the existing facilities.

PPPL has proposed two key projects for SLI funding: Plasma Science & Technology Support Infrastructure, and Critical Utility Infrastructure Systems Upgrade & Modernization. Funding of these projects is critical to fully meet infrastructure goals in support of our research programs. These projects will provide the facilities and infrastructure required for a modern and reliable research facility and have the added benefit of eliminating 60% of the Laboratory's entire Deferred Maintenance backlog ($6.5M of $10.7M). Details of the proposed projects are discussed in Section D.9.b.

Over recent years, the Laboratory has realized efficiency gains by consolidating staff and functions and disposing of older outlying buildings. This trend has enabled greater control of expenditures and we will continue to pursue this strategy. A decrease in DOE programmatic funds (or without adequate GPP or SLI funds) will require PPPL to aggressively remove buildings from service. The priority would be on infrastructure safety at the expense of capability. Maintaining a dynamic infrastructure requires a flexible plan that can respond to changing needs and we anticipate that additional capital projects may crop up causing the forecast of needs beyond a few years to change. We will review the budgets allocated by DOE and make prudent stewardship decisions based on carefully balancing priorities between safety, stewardship, and mission accomplishment.

Improving Efficiency by Reducing our Footprint



The U.S. project office for ITER, a major international fusion experiment, has relocated from Princeton Plasma Physics Laboratory (PPPL) to Oak Ridge National Laboratory (ORNL) to optimize the roles of the two Department of Energy (DOE) national laboratories. PPPL efforts have shifted to renovate and modernize existing offices in preparation for NCSX and to provide adequate high quality space for PPPL collaborations. The buildings, shops, storage areas and offices in proximity to the NCSX Test Cell are being improved to support the project's construction and operation. Several GPP projects are planned and underway to ready these facilities for NCSX.

B. Overview of Site Facilities & Infrastructure

The U.S. Department of Energy's Princeton Plasma Physics Laboratory (PPPL) is a Collaborative National Center for plasma and fusion science. Its primary mission is to develop scientific understanding and key innovations leading to an attractive fusion energy source. Associated missions include conducting world-class research along the broad frontier of plasma science and technology, and providing the highest quality of scientific education.

The Princeton Plasma Physics Laboratory has engaged in fusion energy research since 1951. The reaction occurring in our sun as well as in other stars is fusion. In a fusion reaction, the nuclei of hydrogen atoms, in a plasma state, fuse or join to form helium atoms, causing a release of neutrons and energy. Unlike the sun, PPPL's fusion reactions are magnetically confined within a vessel or reactor under vacuum conditions. The long-range goal of the U.S. Magnetic Fusion Energy Research Program is to develop and demonstrate the practical application of fusion power as a safe, alternative energy source. In the early 1950's, Dr. Lyman Spitzer's vision for plasma physics culminated in Project Matterhorn, which gained approval of the U.S. Atomic Energy Commission. Its mission was to contain and harness the nuclear burning of hydrogen at temperatures exceeding those found in the sun. Named for, Dr. Spitzer's A, B and C stellarators, PPPL was first located on the James Forrestal Campus and in 1959, PPPL moved to its present location at C-site. In the late 1970's, D-site became the home of the Tokamak Fusion Test Reactor (TFTR), which has been dismantled, and is now the home of the National Spherical Torus Experiment (NSTX).

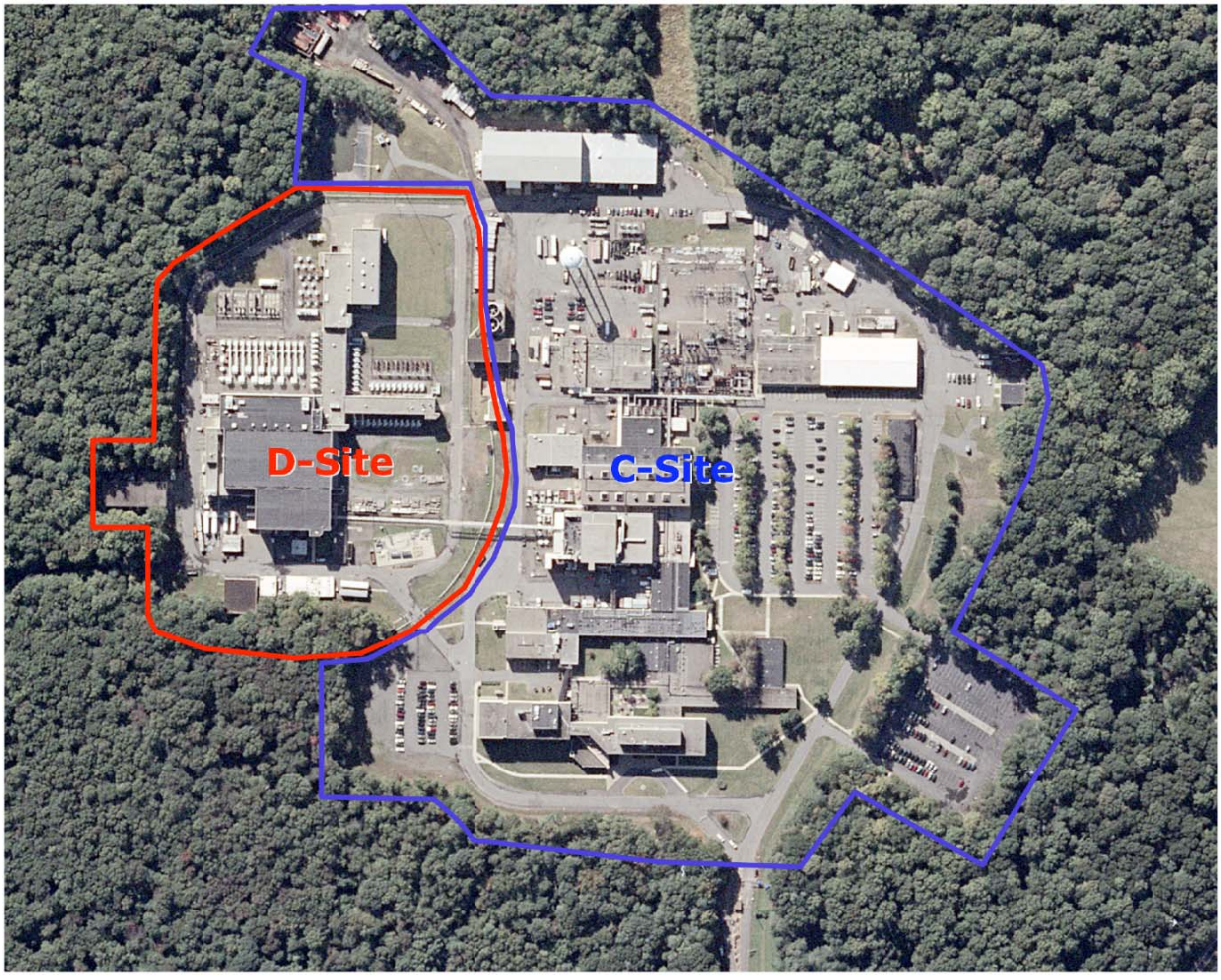
National Spherical Torus Experiment (NSTX)

The Princeton Plasma Physics Laboratory (PPPL) is operated by Princeton University for the Department of Energy under contract DE-AC02-76CH03073 and funded by the DOE Office of Science as a Program Directed (single mission) Laboratory. The prime Management and Operations contract will be re-competed prior to the end of FY 2008. The PPPL FY 2007 total funding is $76.3M; the FY 2008 current total funding is estimated at $84.2M and the PPPL estimated funding for FY 2009 is $89.3M. The current laboratory population consists of approximately 425 employees, and approximately 125 visiting collaborators, subcontractors, students, temporary employees and guests on site on a given day. The Laboratory is located on 88.5 acres within the Princeton University Forrestal Campus approximately mid-way between Philadelphia and New York City. Princeton Forrestal Campus is one of the nation's premier university-associated office/research parks. The center provides an outstanding work environment with businesses, research institutions, and hotel/conference facilities in reasonable proximity to very desirable residential communities. The 1,750-acre Campus is punctuated by dense woods, brooks and nearby streams; almost 500 acres remain in their natural state in order to protect and enhance the character of the Center. It is in this idyllic setting that the Plasma Physics Laboratory is centered. Over the last several years, the area surrounding the Laboratory has continued to develop with the construction of additional office and research buildings, emphasizing the importance of maintaining good community and external relations.

The Laboratory utilizes 721,996 square feet of space in Government-owned buildings located on "C" and "D" sites [see Figure 1]. The Total Replacement Value (RPV) of all PPPL facilities and infrastructure is $438,541,357. Non-Programmatic RPV, used for calculating Indices, is approximately $298M. The Programmatic (OSF 3000) RPV is $137,811,7.33and includes TFTR and NSTX equipment. There are thirty-four buildings: twenty-six buildings on C-Site, seven buildings on D-Site and one off-site. The Asset Utilization Index (AUI), per FIMS Report number 82, is .998. Facility maintenance funding is based on a calculation of 2% of the Replacement Value – referred to as the Maintenance Investment Index (MII). The PPPL MII for FY2007 is $5,996,547.

The existing contract between the DOE and Princeton University also provides for an ultimate build-out potential of approximately 900,000 square feet, allowing for the possibility of moderate expansion, although no expansion of the Lab's footprint is planned at this time. The overall condition of the Laboratory's facilities is considered adequate. Presently, there are no known conditions that could seriously impact establishing new or expanding current missions.

Figure 1. PPPL C- and D-Sites



Space and building information is displayed in Figures 2 through 5.

Figure 2. Condition of Laboratory Buildings.

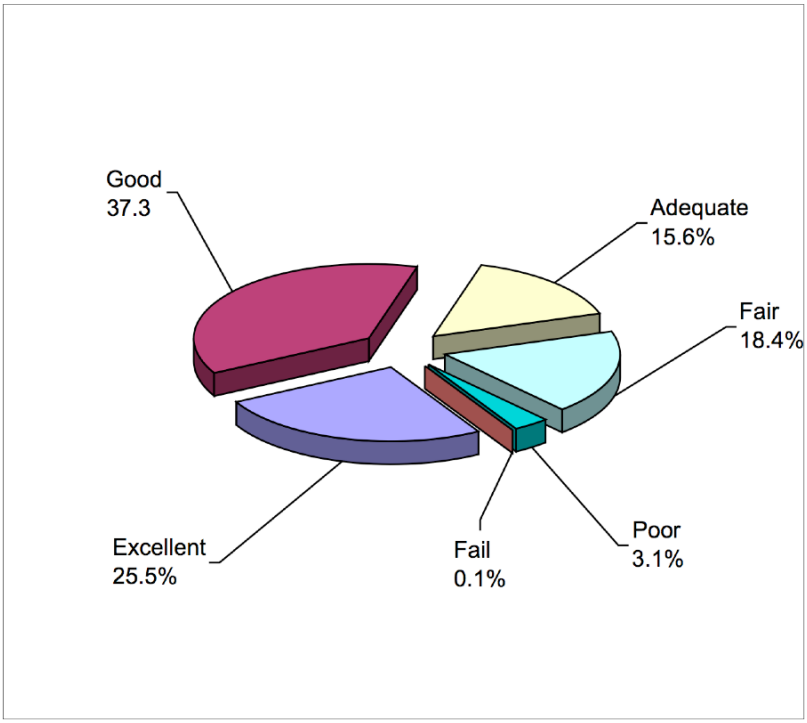


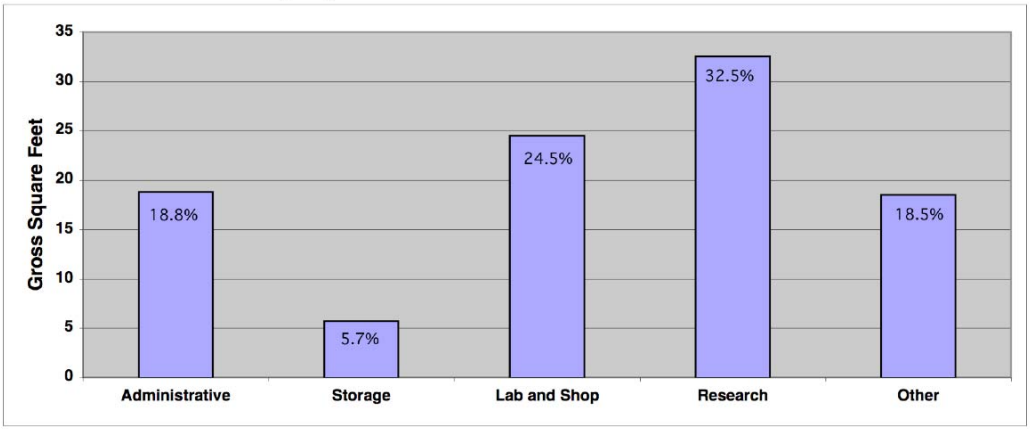
Figure 2. Change in Condition of Laboratory Buildings 2005 through 2007.

Condition of Building Space	2005	2006	2007
Excellent	25.4	25.3	25.5
Good	19.3	16.5	37.3
Adequate	44.9	41.2	15.6
Fair	7.2	13.6	18.4
Poor	3.1	3.1	3.1
Fail	0.1	0.1	0.1
Shutdown pending disposal		0.2	

Figures 2 and 3 display the condition of PPPL Buildings indicated as a percentage of total gross sq. ft. Marked progress was made from FY2006 to 2007 in improving the condition of buildings. The increased spending on deferred maintenance reduction resulted in a 17.1% net improvement in building conditions. The .1% considered to be "failing" is due to the off-site Canal Pump house that will be repaired as necessary or replaced. The 3.1% considered top be "poor"

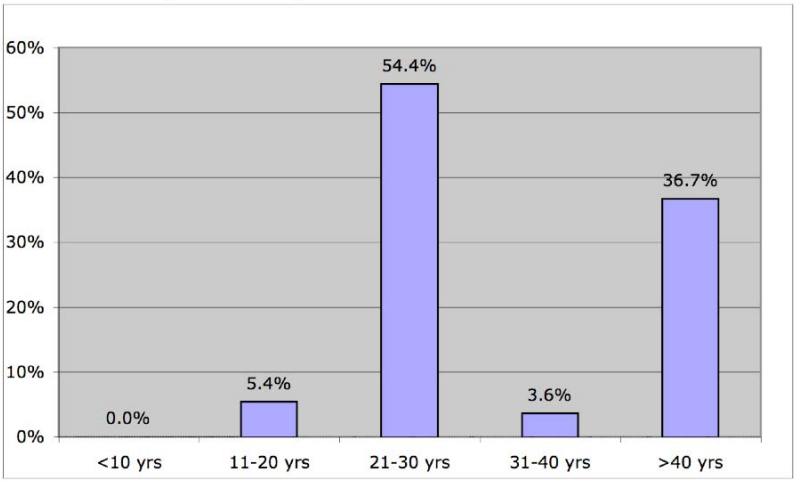
includes the Material Storage Building, CAS Building and Theory Building. The Material Storage Building, used for temporary storage of hazardous materials, will eventually be removed. Consideration is being given to consolidating hazardous material storage in the Radiological Waste Handling Facility, which will allow removal of the Material Storage Building. The CAS Building and Theory Building will be eliminated as part of the multi-phase line item project that will commence in 2010 and be completed by 2013.

Figure 3. Use of Laboratory Space



Indicated as a percentage of total gross sq. ft.

Figure 4. Age of Laboratory Buildings



Indicated as a percentage of total gross sq. ft.

C. Current and Future Mission for the Site

The Ten Year Site Plan and the PPPL mission are consistent with the DOE Strategic Plan, the Office of Science Strategic Plan, and the Office of Science Publication "Facilities for the Future of Science: A Twenty Year Outlook." The Princeton Plasma Physics Laboratory (PPPL) is the only Department of Energy Lab devoted primarily to plasma and fusion science and is the leading U.S. institution investigating the physics of magnetic fusion energy. PPPL is the Collaborative National Center for plasma and fusion science. PPPL's mission focus is to make the scientific discoveries and develop the key innovations that will lead to an attractive new energy source; conduct world-class research along the broad frontier of plasma science and technology; and provide the highest quality of scientific education.

The majority of PPPL funding comes from the DOE-SC Office Fusion Energy Sciences program, with additional funding from the DOE-SC's program in Advanced Scientific Computing Research (PPPL participates in several SciDAC projects) and in High Energy Physics (for which PPPL has a theoretical research effort that uses unique capabilities of the laboratory in the area of advanced accelerator R&D). The DOE-SC Science Laboratories Infrastructure program provides funding of line item construction to maintain the general purpose infrastructure facilities. The Safeguards and Security program provides for protection of nuclear materials, government property, and other vital assets from unauthorized access, theft, diversion, sabotage, or other hostile acts. These activities result in reduced risk to national security and the health and safety of DOE and contractor employees, the public, and the environment. The PPPL S&S program consists of protective forces, security systems, cyber security, and program management.

In support of the increasingly collaborative nature of PPPL's research, office space, areas for small experiments, and shop areas are being modernized with an eye towards suitability and versatility. Available office spaces are being prepared and "pooled" for use among the various collaborative projects. This allows dedication of a smaller amount of space and reduces the total amount of resources dedicated to preparing and maintaining office space. Similarly, shop space is being refurbished and used cooperatively among projects. Examples of this are the refurbished RF shop in room C105 and the new machine shop that was relocated into room S109. The RF shop has been readied for operations in support of NCSX construction and operations. The S109 shop now accommodates the needs of NCSX, several Plasma Science & Technology Department projects and graduate student research. Lab areas are also being refurbished to be more modern and flexible, allowing them to be reconfigured quickly and efficiently to meet the needs of new and changing small projects. The Lab in room L245 is an example of how an old shop area, which had been converted to a pseudo experimental area, was gutted and refurbished with adequate power, HVAC, and lighting to support lithium device testing and device modifications.

The projected funding profile for PPPL is displayed in the following table.

PPPL Funding / Staffing Profile FY2006- FY2017 ($ in Millions)					
	Total	**Other**		**Total**	**Total**
Fiscal Year	**OFES**	**DOE**	**WFO**	**Funding**	**FTE's**
FY2007	70.8	3.7	1.8	76.3	425
FY2008	78.5	3.7	2.0	84.2	433
FY2009	83.5	3.7	2.1	89.3	452
FY2010	84.6	4.0	2.5	91.1	450
FY2011	87.8	4.0	2.5	94.3	440
FY2012	90.2	4.0	2.5	96.7	423
FY2013	93.7	4.0	2.5	100.2	423
FY2014	96.8	4.0	2.5	103.3	423
FY2015	99.5	4.0	2.5	106.0	423
FY2016	103.5	4.0	2.5	110.0	423
FY2017	107.5	4.0	2.5	114.0	423
FY2018	111.5	4.0	2.5	118.0	423

Several specific facilities changes that are needed to support the major PPPL activities are discussed further under each activity's narrative below.

Fusion Energy Sciences

The laboratory hosts experimental facilities used by multi-institutional research teams and also sends researchers and specialized equipment to other fusion facilities in the United States and abroad. PPPL is the host for the NSTX, which is an innovative toroidal confinement device, closely related to the tokamak, and has started construction of another innovative toroidal concept, the NCSX, a compact stellarator. PPPL scientists and engineers have significant involvement in the DIII-D and Alcator C-Mod tokamaks and the NSF Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas in the U.S. and several large tokamak facilities abroad, including JET (Europe), JT-60U (Japan), and KSTAR (Korea). This research is focused on developing the scientific understanding and innovations required for an attractive fusion energy source. PPPL scientists are also involved in several basic plasma science experiments, ranging from magnetic reconnection to plasma processing. PPPL also has a large theory group that does research in the areas of turbulence and transport, equilibrium and stability, wave plasma interaction, and heavy ion accelerator physics. PPPL, LBNL, and LLNL currently work together in advancing the physics of heavy ion drivers through the heavy ion beams Fusion Virtual National Laboratory. PPPL, in partnership with ORNL, manages the U.S. ITER Project Office. Through its association with Princeton University, PPPL provides high quality education in fusion-related sciences, having produced more than 200 Ph.D. graduates since its founding in 1951.

Major Activities
Following are the major activities that PPPL will pursue to support aspects of the DOE mission and build on core strengths and capabilities of the laboratory.

The major activities are:
1. ITER
2. National Spherical Torus Experiment (NSTX)
3. National Compact Stellarator Experiment (NCSX)
4. Collaborative Computing

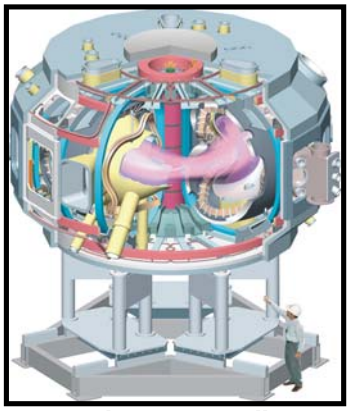
• **U.S. participation in the ITER Burning Plasma Physics Experiment**
Oak Ridge National Lab (ORNL) in partnership with PPPL will host the U.S. ITER Project Office. PPPL is participating in the U.S. efforts on this collaborative international science endeavor based around a fusion tokamak experiment operating at over 100 million °C and producing 500 MW of fusion power for over 400 seconds. Targeted at producing the first fusion experiment capable of sustained production of fusion energy, ITER is a necessary step toward the ultimate realization of fusion power as a viable alternative to current sources. ITER will be located in Cadarache, France. PPPL's efforts on the ITER project are not expected to require increased staffing or the development of new facilities. More likely are the needs to renovate existing laboratory, shop and office space to support the ITER activities. These renovations will be phased-in, as needed, over the next several years. Thus far offices have been updated for use by ITER team members and collaborators and some experimental areas have been provided for ITER use.

• **The National Spherical Torus Experiment (NSTX)**
Having begun operations in FY 1999, research on NSTX is considerably broadening the scientific scope of high temperature plasma physics. The innovative spherically shaped plasma configuration of NSTX may have several advantages, a major one being the ability to confine a higher plasma pressure for a given magnetic field strength. This has been demonstrated both experimentally and theoretically and will provide unique scientific input to the ITER Project. Since the amount of fusion power produced is proportional to the square of the plasma pressure, the use of spherically shaped plasmas could allow the development of smaller, more economical fusion reactors, as well as cost effective Component Test Facility. By utilizing over $170M of PPPL site credits, a world-class, low cost device was constructed as a joint project that includes PPPL, Oak Ridge National Laboratory (ORNL), the University of Washington, and Columbia University. The NSTX Facility is being operated by PPPL as a national facility with collaborators from universities, industry, and national laboratories.

NSTX is an operating experiment that is not expected to require additional buildings, staffing or utility capacity in the next few years, although future project upgrades that are being considered could result in the need for facility upgrades and added utility capacity.

• **The National Compact Stellarator Experiment (NCSX)**

The NCSX is a new experimental facility being fabricated and constructed by PPPL (lead) and ORNL at PPPL. NCSX is the centerpiece of the U.S. effort to develop the physics and determine the attractiveness of the compact stellarator as the basis for a fusion power reactor. Operations are planned to begin in FY 2011. This innovative magnetic confinement experiment is the product of years of theoretical analysis and computer modeling. It is predicted that by confining the plasma within a highly optimized set of external coils, a very robust, stable plasma will result that is naturally capable of continuous operation at high temperatures and densities. The results of the experiment will greatly enhance our understanding of toroidal confinement for devices such as ITER and its successors.



National Compact Stellarator Experiment (NCSX)

NCSX takes advantage of many existing PPPL site credits and will not require a significant increase of facilities. The NCSX test cell is sited in the renovated area where the former PBX/PLT test cells were located. With the approval of CD-3, the project began fabricating the production components for the facility, including the vacuum vessel sub-assemblies and modular coil winding forms.

A new machine shop has been mobilized in the PPPL Shop Building, which is in close proximity to the NCSX test cell. This new machine shop is available for the Plasma Science & Technology Department's project use as well. The machine shop eliminated the need for the old machine shop in room T260 of the Engineering building, which has been renovated and converted into experimental and fabrication space for small experiments.

Extensive facility upgrades are proposed to support NCSX and smaller projects and to modernize the Laboratory for future work. Two Science Laboratories Infrastructure (SLI) projects have been proposed by PPPL to accomplish this need. These projects are key to enabling PPPL to meet the goals of the American Competitiveness Initiative by providing first class facilities. Renovation of Labs and offices in proximity of the NCSX test cell are anticipated for the next few years. Relocations of certain staff will also be required. Major mitigation of the transite (asbestos containing cementitious material) walls of the COB, CS, and RF buildings is required and will be performed in phases as GPP funded projects. The first of these GPP projects was completed in the Spring 2006 when the CS building was encapsulated with new siding that covers the transite and provides insulation.

Lab staffing is expected to increase slightly over the next three years as NCSX fabrication and construction accelerates. Once NCSX is fully operational, NCSX and NSTX will alternate operating 24 weeks every other year. Each facility will be serviced and modified, as appropriate, during the periods when the other facility is in operation. This plan for alternate periods of operations and upgrades permits the most cost-effective use of shared components and subsystems as well as the joint team of scientists, engineers, and technicians – avoiding significant increases in staffing or expansion of facilities.

• Collaborative Computing and Theory

PPPL's collaborative computing efforts are intended to maximize potential from ongoing experiments, while assisting in daily research and development of innovations, through collaborations among the U.S. fusion science community in the development of computer codes and sharing computational resources. Advanced computing has already proven useful in optimizing the design of devices used in fusion research, such as NCSX, and the communication of research data among the fusion research community is a practical and necessary aspect of achieving the overall goal of affordable fusion energy. The Computational Plasma Physics Group (CPPG) currently plays a key role in this Fusion Collaboratory. As an example, PPPL's TRANSP code is currently being used worldwide for data interpretation via the Fusion GRID. PPPL has had great success maintaining this large code on a single architecture and making it available through the GRID.

Significant staffing increases for collaborative computing are not anticipated, nor are additional buildings. Electrical utility and HVAC upgrades and capacity increases will be needed for the computing activities – underscoring the need for funding the SLI projects proposed by PPPL to accomplish these upgrades. Reconfiguration of existing computing facilities (i.e., the PPLCC and FCC) should provide adequate space over the next five years to support on-site hardware for Collaborative Computing.

• Off-Site Research

Members of the PPPL research staff are participating in experiments at leading national and international facilities, thereby contributing important skills to the host teams, while strengthening the PPPL scientific program. National and international facilities provide opportunities for cutting-edge scientific research. While contributing to the programs at these facilities, PPPL scientists are taking advantage of resources at the Laboratory in the areas of theoretical support, diagnostic and radio frequency (RF) development, and integrative data analysis. This provides an excellent platform to address a wide range of key issues of fusion plasma science. Key interests of PPPL collaborators include advanced confinement regimes, magneto-hydrodynamic (MHD) stability, RF physics, supra-thermal particle effects, and divertor physics.

In addition to scientific personnel, experienced engineers are contributing to the operations teams at DIII-D (located at General Atomics) and C-Mod (located at the Massachusetts Institute of Technology), and are helping with the design and construction of upgrades and modifications to these devices.

• Plasma Science and Technology

Small-scale experiments are undertaken at PPPL in the areas of basic plasma physics, innovative fusion concepts, and applied plasma technology. This research diversifies the Laboratory's program, strengthens our connections with other fields of science, such as high energy physics and space physics, and plays an important role in the training of graduate students and postdoctoral associates. The Laboratory also encourages technology transfer from fusion research to address the near-term needs of the nation, such as plasma processing technology, and improved plasma thrusters for communications satellites.

Replacement or major modernization of the Lab-wing and Lab Building facilities is needed to allow safer, more reliable, and more flexible experimental activities. Given the projected growth rate of PS&T projects, the size of these areas will be adequate for the next few years. After that time, replacement or major renovations of existing buildings will be required to accommodate further growth. A more effective strategy involves a line item project that has been proposed to construct a new science and technology building that will replace the Lab Building (see section D.9 for details of the project). In the mean time, modest experimental facility upgrades in Lab-wing and Lab buildings will proceed at a rate of 1 or 2 rooms per year.

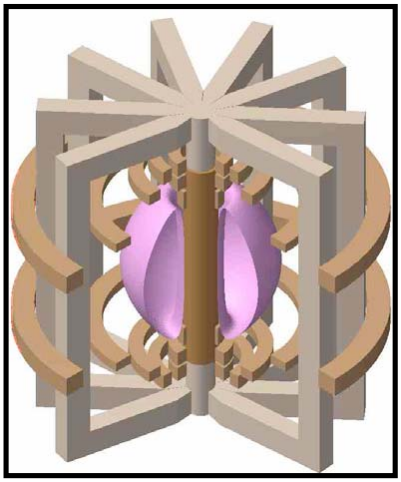
• The Graduate Program in Plasma Physics and Science Education

The Laboratory places great importance on the continuation of its close relationship with the Princeton University Program in Plasma Physics. The Program, with over 200 Ph.D. graduates since its inception, provides training in plasma physics relevant to magnetic fusion, as well as in the broader field of plasma science. The scientific diversity of PPPL, as well as its outstanding capabilities in magnetic-confinement fusion, continues to attract the highest quality students to the Program. Within the School of Engineering, the Program in Plasma Science and Technology brings together students from a broad range of departments involved in plasma studies, building ties to fusion plasma science. The Science Education program serves undergraduates and students and teachers in grades K-12. Programs include scientific research experiences, partnerships with school districts, teacher staff development, and curriculum development with an emphasis on Internet-based science investigations for students.

New lab facilities, office refurbishments, and lab upgrades in the RF Building will be required to support new graduate program experimentation, primarily as part of the planned growth of the projects and PS&T activities discussed above.

• Future Large Experimental Devices

Moving beyond ITER toward a compact magnetic fusion demonstration reactor (Demo) will require the integration of high plasma performance in steady-state with advanced methods for dissipating very high divertor heat-fluxes, while respecting strict limits on tritium retention. The considerable gap between upcoming experiments and a Component Test Facilities (CTF) or fusion power plant motivates the proposal of a new experiment – the National High-power advanced-Torus eXperiment (NHTX) – whose mission is to study the integration of high-confinement, high-beta, long-pulse fully-non-inductive plasma operation with a fusion-relevant high-power plasma-boundary interface. The PPPL site power and TFTR test cell and neutral beams are well suited to the NHTX mission. NHTX budget estimates have not been formally proposed, so it is not included in the attached budget charts.



National High-power advanced Torus Experiment (NHTX)

D. Meeting Facilities and Infrastructure (F&I) Performance Requirements

D.1. Vision, Goals, and Strategy (VGS) for F&I

The vision of the organizations that provide infrastructure support is to make the contributions to PPPL and the DOE that enable the Laboratory to reach its full potential as a world leader in fusion and plasma physics science research. Related objectives include:

- Prevention of injuries and minimization of exposure to workers, the public and the environment to radiation and hazardous materials;
- Protection of DOE and Princeton University property;
- Compliance with environmental regulations;
- Operation of facilities in a manner that is efficient and cost effective; and
- Maintenance of an attractive and fully functional facility.

A modern, effective, and efficient physical infrastructure is of critical importance to maintaining PPPL's ability to continue world-class scientific leadership and research in support of the missions of the Office of Science and the Department of Energy (DOE) into the 21st Century. When developing plans and costs for new construction and facilities modifications consideration is given to flexibility, versatility, durability, longevity, use of sustainable design principles, rate of return and reducing operating and maintenance costs.

The overall condition of the Laboratory's facilities is considered good. Presently, there are no known conditions that could seriously impact establishing new or expanding current missions. A listing of buildings, conditions, square footage, and utilization is contained in Attachment 1. A Site map showing buildings and site layout can be found in Attachment 2.

- **Mission:** The laboratory's facilities and infrastructure will be adequate to accommodate each laboratory's expected programmatic mission activities and technological changes well into the 21st century. Facilities will be "right-sized" to the type and quality of space and equipment needed to meet mission needs. Activities and organizations that need to be co-located will be. Facilities will be readily adaptable to changing research requirements and technologies. Off-site leased space will be reduced where economically appropriate.

- **Working Environment:** The laboratory will achieve a quality of facilities, which provides a "preferred" working environment for our researchers that helps attract and retain high quality staff. The laboratory will employ the latest advances in information technology to enhance worker productivity, interactions with other scientists, and the advancement of science. Quality training and conferencing facilities will be available. Visiting scientists will have access to quality accommodations and to research support facilities.

- **Environment, Safety, Health and Security:** The laboratory's F&I will provide a safe, healthy, and secure working environment for laboratory employees and visitors. Retired facilities will be removed and environmental cleanup will be completed. The Laboratory will be viewed as a good community neighbor.

- **Operations and Maintenance:** F&I will be efficient to operate and maintain.

Facility and Infrastructure Issues

With the exception of the TFTR-related construction, most of the PPPL buildings and facilities are 40 years or more old, and, although structurally sound, will eventually require renovations to extend their use or to adapt them to house new programs.

Adequate space exists for PPPL's fusion devices, as well as for current and future non-fusion plasma science and technology projects. The pressing issue is the need to refurbish existing areas in order to support current and future work. The prime example is the National Compact Stellarator Experiment (NCSX), which has begun construction. Improvements to the buildings, shops, storage areas and offices in proximity to the NCSX Test Cell are underway. These facilities will support the NCSX project as well as future experimental devices. Improvements to office space will also be needed to accommodate new scientific collaborators who will work on NCSX. Other space throughout the Lab will be more efficiently utilized in order to accommodate operations that might be displaced as a result of NCSX needs. Several renovations and GPP projects have begun or are being planned over the next few years to upgrade these facilities.

Increasing demand for smaller laboratory areas where Principal Investigators and students can conduct research heightens the need to refurbish underutilized space. The same holds true for offices that are not currently occupied, but must be refurbished before they can be used. Good quality office space is nearly fully utilized during peak periods and in the summer when there is an influx of students, and the need for office space will increase in the vicinity of the NCSX test cell as construction progresses and operations near. Efforts over the past two years have focused on renovating small groups of offices, reclaiming office space that has been used for storage or inefficiently, and improving office conditions in conjunction with office moves. These efforts have resulted in the development of a small bank of offices that are pooled for use by visiting collaborators and post-docs on various projects. This cooperative scheduling and use of offices has proven beneficial and will be expanded as opportunities arise.

Over recent years, the Laboratory has consolidated staff into the main buildings and disposed of older outlying buildings. This trend has enabled a reduction in expenditures and we will continue to pursue this strategy. The Director's Office, the DOE Office, research and engineering groups and most administrative support activities are now centrally located at C-Site while NSTX is the primary experimental facility at D-Site. Requests for office space are, at times, difficult to accommodate within a reasonable proximity. On the other hand, there are areas of experimental, shop and lab space not being used because the activities they supported are no longer funded. These areas are generally within older, underutilized facilities. However, we have taken advantage of these facilities by renovating some underutilized shop and lab space. For example, the RF building is undergoing staged renovations and outdated laser lab areas have been renovated for use as a Science Education Laboratory and learning facility. The most recent example of space consolidation and renovation of old areas is the relocation of the Health Physics Calibration and Service Laboratory (CASL) that was completed in FY07. Outdated and unused lab space in the RF building was renovated to house the new CASL facility, and the old deteriorated CASL buildings were demolished and removed. This resulted in the banking of 2,170 sq.ft. and reclamation of the unused RF building labs. Another example of consolidations

is the recent reclamation of a former machine shop area for use by the new NCSX project and experimental projects. This project also consolidated a smaller machine shop from the second floor of the Lab Building. The area vacated by the small machine shop will be converted for use by small experiments.

Long-term efforts continue toward consolidating personnel and functions, and reducing reliance on high maintenance, temporary, and facilities that are in poor condition. The Health Physics Calibration and Service Laboratory (CASL) was demolished in FY06 and the D-Site Tritium Module was demolished in FY05. Studies into consolidating operations from the Hazardous Waste Storage Building into the relatively new Radiological Waste Handling Facility are also being investigated. This would allow the demolition of the Hazardous Waste Storage Building and more efficient and centralized services, which are all provided by the Materiel and Environmental Services Division. This activity will be carefully planned to avoid operational disruptions and to thoroughly address ES&H concerns.

Much needed roadway re-paving was performed in FY 06 and additional paving will be accomplished in FY07 and FY08. Parking space is adequate at this time. Area for storage space is also adequate; although, storage is sometimes more remote than desired and several storage areas need to be cleared of outdated equipment and organized for more efficient use of the space. Fabrication and construction activities for NCSX have made consolidation of storage and shop space a more pressing issue, especially in the vicinity of the NCSX Test Cell. Renovation of the 3rd and 4th floors of the RF building for use as short-term and medium-term storage of experimental equipment has begun. Two rooms on the 3rd floor of the RF Building have been cleared and made available to the Plasma Science & Technology Department (PS&T) for their storage needs, another area on the 3rd floor has been cleared for use as a new experimental testing area, and another will be cleared of decommissioned capacitors. Inventory controls are being established to ensure control of future use of these areas. This reclaimed space allows the PS&T Department to alleviate hazards in the Laboratory building that were caused by crowded conditions and it also frees valuable room in the Lab wing to perform experimental activities.

D.2 Process for Identifying F&I Needs and Development of Plans to Meet the Vision, Goals, and Strategy (VGS)

Prioritization Process

This TYSP covers a planning horizon of ten years (FY 2009 through FY 2018) and also includes data for FY 2006 - 2008. The TYSP describes the existing site and infrastructure of the Princeton Plasma Physics Laboratory (PPPL) in terms of how it supports current programs and what is needed to support programs planned for the future.

PPPL uses Procedure GEN-009 “GPP Prioritization” for assessing and prioritizing proposed GPP Projects. The Technical Resources Committee (TRC) is the final authority for establishing GPP Priorities and annual work plans and is composed of senior management representatives from technical, scientific, and administrative organizations within the Laboratory. The Maintenance & Operations Division serves as the focal point for collecting proposed projects. Proposed projects result from input from various organizations working at PPPL, but also as a result of facility assessments routinely performed by Maintenance & Operations. To facilitate

the decision-making process, the TRC has formed a subcommittee, which is composed of subject matter experts from across the Laboratory to evaluate the merits of individual projects. This subcommittee uses criteria developed by the DOE for the Capital Asset Management Process (CAMP) to evaluate the proposed projects. It is important to note that the CAMP criteria is intended to be a tool for management to rank projects, but it is not intended to replace sound management judgment in reaching final decisions on project priorities. Prioritization results are shared with the DOE Princeton Site Office, which provides concurrence prior to authorizing work on any Project.

The CAMP prioritization process is a systematic, structured, and consistent method for determining the preferred order for allocating limited resources to solve problems. The process reflects the values of the Department of Energy and it includes two elements of risk -- consequence and probability. The process is universal encompassing four major categories: (1) health and safety, (2) environment/waste management, (3) safeguards and security, and (4) programmatic. These rating criteria were developed and positioned based upon Departmental intentions and public expectations, appropriate standard industrial practices and they represent the desired level of operational conduct. As mentioned previously, this process is used for the General Plant Project Program, but it has also been adapted and extended for use on a selected few operating expense projects, as well.

Maintenance priorities are established on a fundamental basis that relies heavily on the knowledge and experience of in-house engineers and technicians. Typically, 3000 to 3500 work orders are completed in a given fiscal year. Priorities are established to address work tasks that: (a) affect environment, safety, health or security issues; (b) are directly related to facility operations; (c) require immediate action to restore equipment to operable status; and (d) provide preventive maintenance to operate the facilities in an efficient manner.

Facility Information Management System (FIMS)

The Facility Information Management System (FIMS) is a web-based database designed to track real property information for the Department of Energy (DOE). PPPL has responsibility to maintain the data in the database pertaining to PPPL buildings and other structures as accurately and reliably as possible.

The responsibility for FIMS at PPPL resides jointly in the Maintenance & Operations (M&O) and Accounting divisions. The M&O Division has primary responsibility for physical inspection of real property and determines specifications, present condition and utilization status. The position responsible for annual inspections is the Real Property Asset Management Coordinator. In addition, the M&O Division determines real property values (RPV) and maintenance costs (deferred, actual and required) and enters these values in FIMS. Accounting Division staff occasionally enter other information. Employees responsible for data collection and data input in both the Accounting and M&O Divisions participate in monthly FIMS conference calls and attend scheduled FIMS conferences and training as deemed appropriate.

PPPL staff make every effort to accurately measure, assess or otherwise determine the information required in FIMS. The Accounting and Maintenance & Operations Divisions work together to ensure that data is accurate and up-to-date. Accounting will automatically update

records based on information contained in final cost reports approved by the DOE Princeton Site Office for projects which: a) have modified a facility or structure contained in the database; or b) should be added to the database. The DOE-PSO approval indicates which FIMS record to update. Once per year, a random sample of FIMS assets is validated by the DOE site office. The FY07 Validation was completed during May 2007, and resulted in the PPPL FIMS database being rated "Green", which is the highest rating possible.

Designated staff of the Maintenance & Operations Division collect FIMS data through physical inspection of the property and other reliable sources. Information regarding the condition of facilities and structures observed during routine inspections and in the performance of maintenance and repairs to real property is documented. Approximately 20% of PPPL real property is inspected annually by personnel from the Maintenance & Operations Division and the Power Engineering Branch, and the results are documented in a detailed listing of deferred maintenance tasks by building and OSF. The Division Heads for Accounting and M&O are responsible to report any major changes in the data reported in FIMS to the DOE-Princeton Site Office. They must also report any change to the overall site's real property value that is greater than 5% and provide an explanation.

The site-wide conventional Replacement Plant Value (RPV) at PPPL for Buildings and OSFs totals $297,785,065 as of June 1, 2007. [Note: Conventional RPV is total RPV minus Category 3000, excess facilities and site preparation.] The HP Calibration Lab (C94) was demolished and removed in summer 2006 which reduced overall square feet at PPPL by 2,170. This record was archived in FIMS. The C-Site Pumphouse (C60) is 'Shutdown Pending Disposal.' The Cooling Tower portion of this structure was removed in 2004. RPV for this asset is excluded from Office of Science conventional RPV because the facility is 'excess.'

Facilities Management, Space Management & Utilization

The Maintenance and Operations Division of the ES&H and Infrastructure Department has the lead responsibility for the majority of infrastructure maintenance performed at the Laboratory. In addition, the AC Power Group of the Engineering and Technical Infrastructure Department provides supplemental infrastructure maintenance on high voltage electrical infrastructure systems. The Heads of the ES&H and Infrastructure Department and the Engineering and Technical Infrastructure Department report to the Director of the Laboratory.

The Maintenance and Operations Division is responsible for the following:

- Designing and constructing new structures, modifying existing structures, and coordinating significant site improvements.
- Engineering and planning of maintenance and operations for existing conventional facilities.
- Maintaining, operating, inspecting, and repairing existing conventional facility systems and experimental support systems.
- Managing the site-wide efficient use of energy (electric/gas) and utility (water/sewer) services.
- Coordinating work space planning efforts.
- Providing housekeeping, grounds maintenance (snow removal and landscaping), trash

removal, recycling, and material handling services to the Laboratory staff.
- Maintaining, operating, repairing and modifying security and fire detection, suppression and reporting systems.
- Providing support and service for telecommunications systems, local and long distance equipment and lines, voice mail, billing, calling cards, cellular phones, pagers, 2-way radio systems, and home data lines.

The AC Power Branch of the Electrical Engineering Division is responsible for the following:

- Designing and constructing new structures, modifying existing structures, and coordinating significant high voltage electrical system improvements.
- Engineering and planning of maintenance and operations for existing high voltage electrical system infrastructure.
- Maintaining, operating, inspecting, and repairing existing high voltage electrical system infrastructure.

PPPL Departments and Projects are not charged for space utilization. The Maintenance and Operations Division, line managers and Facility Managers throughout the organization are responsible for facilities management, space management and utilization. The overall PPPL Asset Utilization Index (AUI) is .998, which is considered excellent. The AUI for each of the PPPL facilities is listed in Attachment 2.

Condition Assessment Process

The Condition Assessment Process at PPPL is comprehensive and meets requirements established in DOE Order 430.1B, Real Property Asset Management. The Maintenance and Operations Division and the Power Engineering Branch of the Laboratory perform annual building and facility inspections as part of the Building Inspection Program. Each year, approximately twenty percent of the Laboratory space, based on square footage of buildings, is inspected. The Maintenance and Operations Division establishes which Buildings will be inspected in order to meet the twenty percent per year guidance set forth by DOE. Each building is scheduled for inspection within a five-year time frame.

Each building is inspected by lead craftsmen, who are experts in their field and Engineers using guidelines published by R.S. Means. All building systems are inspected including HVAC, electrical distribution, plumbing, roofing, walls and finishes, floors and finishes, building exterior, superstructure, doors and partitions, foundations, basements, elevators and cranes. Results of the inspections are reviewed by an architect using software from R.S. Means to tabulate and calculate costs of repairs, maintenance and improvements per system. The grand total of deferred maintenance for the current fiscal year and the projected maintenance requirements for the next ten years are then calculated. The dollar amounts per building are then entered into the FIMS database and into the Ten-Year Plan.

The square footage total of PPPL buildings is 721,996 square feet. The following buildings were inspected in FY2006:

RF Building (41,404 sq.ft.)

Admin Wing Cafeteria (9,721 sq.ft.)
Shop Building (17,390 sq.ft.)
CS Building (27,025 sq.ft.)
COB building (9,223 sq.ft.)
PLT Power Building (6,884 sq.ft.)
FCPC (33,997 sq.ft.)`

The total area inspected in FY06 was 145,444sq. ft. or 20.1% of the PPPL total building area of the total 721,996 sq. ft.

The next annual inspections will be completed in the summer of 2007. The resulting data will be entered into FIMS at that time. The buildings proposed to be inspected in the summer 2007 encompass 149,762 sq.ft. or 20.7% of the PPPL total building area and include the following:

D-Site Experimental Area (Mockup) D42 (92,136 sq.ft.)
NBPC D53 (43,680 sq.ft.)
D-Site Radiological Waste Handling Facility D45 (5,600 sq.ft.)
System Test Building (ESAT) - C50 (8,346 sq.ft.)

D.3 Land Use Plans

Under EM-40, the Environmental Restoration Program completed a comprehensive site-wide remedial investigation (RI) and remedial actions (RA) to address soil and ground water contamination present at the facility. This aggressive remedial strategy identified sites or operable units that could be quickly and easily remediated or stabilized to meet regulatory requirements. The purpose of this strategy is to address significant remedial measures rapidly and to move a site into monitoring as quickly as feasible, thus reducing DOE's long-term environmental mortgage. All environmental restoration work is overseen by the New Jersey Department of Environmental Protection (NJDEP), as required by a Memorandum of Understanding (MOU) between NJDEP and Princeton University.

All identified Areas of Concern with soil contamination have been remediated to below the applicable NJDEP Soil Cleanup Criteria. Ground water beneath the site is contaminated with chlorinated volatile organic compounds (VOCs), primarily tetrachloroethylene (PCE), trichloroethylene (TCE) and 1,1,1-trichloroethane (TCA) at levels above the New Jersey Ground Water Quality Standards. Contaminated ground water is contained and captured by PPPL's foundation drainage system (primarily the D-site building complex), which discharges to the on-site detention basin.

Contaminated ground water is not migrating off-site. In addition to the ground water containment and extraction system created by the foundation drains, natural processes are degrading contaminants into less toxic by-products. Based on these findings, PPPL proposed a remedy that relies on the foundation drainage system to contain and extract contaminants and natural attenuation processes to degrade contaminants over time. A Remedial Action Work Plan (RAWP), outlining the procedures that used to monitor ground water conditions and ensure continued function of the foundation drainage system, was prepared and submitted to NJDEP in May 2000 and was approved by NJDEP later that year.

The final regulatory submittal, application for an Aquifer Classification Exception Area (CEA) designation was made to NJDEP in January 2002. NJDEP approved the CEA application in February 2002. Between 2002 and 2004, PPPL conducted quarterly ground water monitoring as required by NJDEP regulations. Since 2004, PPPL conducts annual ground water monitoring necessary to document containment by the foundation drainage system and degradation of contaminants. Long-term groundwater monitoring is expected to continue for up to 25 years, until contaminants have degraded to below regulatory levels. Budget estimates are based upon a relatively stable program that uses FY2000 costs as a planning base.

In 2006 PPPL received a new surface water discharge permit covering its detention basin outfall. The new permit includes expanded monitoring and a target discharge limit for tetrachloroethylene (PCE). The target discharge limit will become an enforceable discharge limit at the beginning of the next permit cycle (February 2011). PPPL is addressing this issue with the NJDEP permit manager and the Site Remediation Case Manager to identify an acceptable path forward.

Environmental Management System (EMS) Program

Environmental Management System (EMS) is not a new program at PPPL. Since the 1980's, PPPL has had a system to address environmental concerns and issues and a method by which to minimize impacts. An EMS is a process that ties together all elements that should be included in a facilities environmental protection program. Each year, the program is evaluated against a standard, regulation, or other measurement tool; following the evaluation, actions for improvements are recommended, and a plan is prepared and presented to senior management. The process continues as the actions are implemented and annually reviewed by a PPPL assessment team. Progress is reported to senior management, and the cycle continues as a new plan of action is implemented.

Integration of EMS principles into an organization allows the organization systematically to reduce its overall environmental impact. Adoption of an EMS often results in increased organizational effectiveness. Executive Order 13148 requires all appropriate Federal facilities, including DOE laboratories, to develop and implement an EMS. DOE Order 450.1 requires that DOE facilities integrate their EMS programs into the existing Integrated Safety Management System (ISMS). In December 2005, PPPL submitted to DOE-Princeton Site Office its self-declaration of the EMS program. PPPL continues to use its EMS as the primary tool for managing environmental compliance and improved environmental performance. PPPL has made significant improvements in the areas of energy management, water conservation, waste minimization/recycling, beneficial landscaping and environmentally preferred purchasing. PPPL is evaluating Executive Order 13423 and implementation requirements from the Office of the Federal Environmental Executive and DOE-HQ to identify necessary changes to its EMS program and environmental performance goals.

D.4 Utilization and Excess Real Property

PPPL has been implementing a long-term plan to consolidate personnel and functions, and reduce reliance on high maintenance temporary facilities. This plan has been in place since the mid-1990's and is ongoing. Facilities that were in poor condition and no longer necessary were demolished as part of this program. Theses included the Health Physics Calibration and Service Laboratory (CASL) in 2006, the D-Site Tritium Module (in 2005), and the C-Site Cooling Tower (2004.). The C-Site Pump House is being considered for demolition in future years, as is the Hazardous Material Storage Building. As part of the proposed line item project for SLI funding, the Theory, Administration, CAS, RESA, and Module 6 buildings will all be excessed. This will be possible by the construction of a new science and technology building and the renovation of the Lab and MG buildings. PPPL had 2,170 (gsf) of banked space as of the end of FY06. The line item project would allow PPPL excess an additional 64,170 (gsf) of space. The attached IFI Crosscut budget lists the facilities that will be declared excess and disposed of as part of the line item projects.

The Department of Energy's Three Year Rolling Timeline ((TYRT) identifies Asset Utilization Index (AUI) targets by year for various types of facilities. PPPL currently exceeds these DOE goals. The overall PPPL AUI is 99.8%, which is considered excellent. The table below shows a comparison of PPPL AUIs versus the DOE goals.

Asset Category	DOE Long Term Goal	Current PPPL AUI	PPPL Status
Office	95%	100%	Exceeds Goal
Warehouse	89%	100%	Exceeds Goal
Laboratory	90%	100%	Exceeds Goal
All Other	99%	99.26%	Exceeds Goal

D.5 Long Term Stewardship

Not Applicable. PPPL has no Long Term Stewardship (LTS) activities.

D.6 Replacement Plant Value (RPV) Estimates

The following table lists PPPL's estimated Replacement Plant Value (RPV) for each year through FY18. An escalation factor of 2.3% a year has been applied.

	A RPV of existing facilities at beginning of FY	B Estimated RPV Additions in FY **	C Total Estimated RPV at end of FY (Column A + Column B)	D Escalation (1.023 x Column C)
FY 04	$252,250,827 *	NA	NA	NA
FY 05	$275,483,768 *	NA	NA	NA
FY 06	$297,785,065 *	NA	NA	$297,785,065*
FY 07	$297,785,065 *	NA	$297,785,065	$304,634,121
FY 08	$304,634,121	NA	$304,634,121	$311,640,706
FY 09	$311,640,706	NA	$311,640,706	$318,808,443
FY 10	$318,808,443	($1,044,286.76)	$317,764,156	$325,072,731
FY 11	$325,072,731	NA	$325,072,731	$332,549,404
FY 12	$332,549,404	$11,234,351.51	$343,783,756	$351,690,782
FY 13	$351,690,782	($11,542,025.19)	$340,148,757	$347,972,178
FY 14	$347,972,178	NA	$347,972,178	$355,975,538
FY 15	$355,975,538	NA	$355,975,538	$364,162,976
FY 16	$364,162,976	NA	$365,402,976	$373,807,244
FY 17	$373,807,244	$1,240,000.00	$380,491,244	$389,242,543
FY 18	$389,242,543	$6,684,000.00	$393,698,543	$402,753,609

* The FY04, 05, and 06 values are those provided by DOE-SC's TYSP guidance.

** PPPL has proposed two Office Science SLI funded projects. One is scheduled to begin in 2010 and one in 2016. The RPV additions are the estimated net RPV adjustments resulting from these projects.

D.7 Maintenance

The PPPL funding of maintenance is in line with the DOE-SC guidance to provide 2% of the RPV values. PPPL's planned maintenance funding, along with the major projects and repairs are provided in the attached IFI Crosscut budget.

PPPL *Site Maintenance Funding Plan*

	RPV (with 2.3% per year escalation)	SC Maintenance Funding Goal (2% of RPV)	PPPL Site Maintenance Funding Plan (per PPPL IFI crosscut) ***
FY 07	$252,250,827 *	$5,089,000 **	$5,089,000
FY 08	$275,483,768 *	$5,499,000 **	$5,499,000
FY 09	$297,785,065 *	$5,955,701	$5,636,000
FY 10	$297,785,065 *	$5,955,701	$5,777,000
FY 11	$304,634,121	$6,092,682	$5,922,000
FY 12	$311,640,706	$6,232,814	$6,070,000
FY 13	$318,808,443	$6,376,169	$6,222,000
FY 14	$325,072,731	$6,501,455	$6,365,000
FY 15	$332,549,404	$6,650,988	$6,512,000
FY 16	$351,690,782	$7,033,816	$6,661,000
FY 17	$347,972,178	$6,959,444	$6,814,000
FY 18	$355,975,538	$7,119,511	$6,971,000

* per DOE-SC guidance, used RPVs from FY04, FY05, and February 2007 update for calculating Maintenance budgets for FY07, 08, and 09, respectively.

** per DOE-SC guidance, used numbers from FY08 crosscut budget

*** Direct funding has not been provided in accordance with the DOE-SC Deferred Maintenance Reduction (DMR) funding plan; had they been received, those funds would have been added to site maintenance funding. Also, some DMR investments had been planned for facilities that have since been slated for removal and rehab/renovation under the SLI Infrastructure Initiative; therefore, related DM work will be eliminated upon removal of the affected facilities.

D.8 Deferred Maintenance Reduction (DMR).

According to DOE-SC data, the PPPL deferred maintenance backlog decreased from $11,535,423 in FY05 to $10,694,288 at the end of FY06 for a decrease of $841,135. Since FY04, when PPPL's deferred maintenance backlog was $12,232,069, the backlog has been reduced by $1,537,781 for a 12.8% reduction. PPPL's goal is to reduce the deferred maintenance backlog so that the average ACI for all buildings is above 0.98 prior to FY15.

The Asset Condition Index (ACI) is calculated as 1 minus the ratio of deferred maintenance to RPV. The overall PPPL Asset Condition Index (ACI) is .964, which is a modest improvement from the .96 that it was in FY05. This PPPL ACI is better than the ACI for all DOE-SC facilities of 0.934. The DOE corporate overall ACI goal is .95. The deferred maintenance reduction

funding, combined with the PPPL GPP funding, have begun to have a substantial impact on improving this ACI indicator.

DM as of the end of FY 06, ACI, and DM compared with the DOE goals are shown below.

FY 06 Deferred Maint.	Mission Dependency Code	DOE ACI Goal	DOE ACI Actual	PPPL Actual ACI	PPPL DM Over Goal
$5,835,124	1-Mission Critical	0.964	0.934	0.976	$0
$4,302,226	2-Mission Dependent	0.948	0.934	0.909	$1,843,308
$556,938	3-Not Mission Dependent	0.85	0.961	0.953	$0
$10,694,288	Overall	.95	0.934	0.964	$1,843,308

DOE Office of Science Laboratories have a deferred maintenance (DM) backlog of over $630M primarily because of past under funding of maintenance. To address this backlog, DOE-SC is requiring certain sites to implement a DM reduction effort. PPPL has been included in this DOE-SC deferred maintenance reduction program because the Asset Condition Index for PPPL's Mission Dependent buildings is .909, which is below the DOE goal of .948. PPPL will reach the DOE goal by reducing DM for Mission Dependent Buildings by $1,843,308 below its current level. The required minimum DM reduction funding for PPPL from FY 07 to FY 12 for DM reduction are shown in the table below. Funding beyond FY 12 is also shown, assuming that funding will be provided and continued, using a 2.3% escalation factor, until the DM reduction goal is met. PPPL will attain the necessary DM reduction by strategically applying GPP funds, overhead funds that become available via efficiency improvements and energy savings, and DM reductions that will result from demolitions and rehab and improvements related to line item projects.

The expected PPPL deferred maintenance trend is shown in the following table.

	DOE-SC DMR Funding Goal *	Site DMR Funding Plan (GPP/Other)	Estimate of DM at the end of the Fiscal Year ***	Estimated ACI [1-(DM / RPV)]
FY 07	$396,000	GPP + Other	$10,298,288	0.958
FY 08	$465,000	GPP + Other	$10,070,149	0.963
FY 09	$300,000	GPP + Other	$10,001,762	0.966
FY 10	$300,000	**SLI + GPP + Other	$9,609,259	0.967
FY 11	$300,000	GPP + Other	$9,530,272	0.968
FY 12	$200,000	**SLI + GPP + Other	$8,407,305	0.972
FY 13	$200,000	**SLI + GPP + Other	$6,654,260	0.979
FY 14	$200,000	GPP + Other	$6,607,308	0.979
FY 15	$100,000	GPP + Other	$6,659,276	0.980
FY 16	$0	**SLI + GPP + Other	$6,501,938	0.981
FY 17	$0	**SLI + GPP	$4,977,783	0.985
FY 18	$0	**SLI + GPP	$3,976,473	0.989

* PPPL's Minimum DM Reduction Funding for FY07 and FY08 mandated by DOE-SC guidance while those for FY 09 and beyond can be adjusted as needed, based on backlogs.

** DM will be reduced significantly in FY10, 12, 13, 16, 17, 18 as several buildings and old equipment will be rehabbed, improved, or demolished as part of the two SLI projects.

*** Per DOE-SC guidance, DM calculations began with DM as of end of FY06, which was $10,694,288.

Buildings and infrastructure are inspected thoroughly at least once each five years. Each year, maintenance needs and improvements are re-evaluated for 20% of PPPL facilities by physical inspection. The master list of deferred and future maintenance needs is updated with the new information resulting from the inspections. The other buildings, which were not inspected during the year, are also reviewed and updated without the benefit of a full inspection. Based on funding availability of 2% per year for maintenance, the most pressing maintenance is scheduled for an initial five years of the planning cycle. The Maintenance and Operations Division and the AC Power Branch use the information to update their respective in-house maintenance databases and plan for near term and long-range maintenance requirements. The planning includes prioritizing the maintenance queue using risk-based decision making that considers maintenance history, asset life cycles, ES&H impacts, programmatic impacts, costs and workforce levels and schedules. The reductions in DM are in part due to the ongoing efforts to dispose of high maintenance modular and outlying buildings, to centralize staff and activities, and to provide

adequate maintenance of those centralized facilities. Also helping to decrease the DM backlog somewhat is a new computerized maintenance management system that was purchased and installed in early FY2003. The new system allows for the more efficient prioritization, assignment and scheduling of maintenance tasks. Continued decreases in the deferred maintenance backlog are expected over the next several years as the recent trend continues and as overhead funding for deferred maintenance increases in accordance with the DOE-SC DM reduction goal.

PPPL has a total of four buildings that have an ACI categorization of "Poor" or "Fail". "Poor" means that the deferred maintenance as a percentage of RPV is from 25% to less than 60%. If deferred maintenance divided by RPV is greater than 60%, the building receives a "Fail" rating. The PPPL buildings with a FIMS rating of "Poor" are as follows:

- Hazardous Material Storage Building (C93) 2,100 G.S.F.
  Studies into consolidating operations from the Hazardous Waste Storage Building into the relatively new Radiological Waste Handling Facility are being investigated. This would allow the demolition of the Hazardous Waste Storage Building and more efficient and centralized services, which are all provided by the Materiel and Environmental Services Division. This project will be scheduled when demand for use of the Radiological Waste Handling Facility diminishes over the next few years.

- CAS Building (C91) 15,000 G.S.F.
  The CAS Building deferred maintenance includes a new roof, piping insulation, lighting, gutters and down spouts. An HVAC upgrade was completed in FY2006.The roof replacement is on the PPPL list of ranked GPP jobs.

- Theory Wing (C23) 5,267 G.S.F.
  Painting and carpeting were completed in FY06. The roof was replaced in FY07. Wall unit heater replacements are on the list of ranked GPP projects.

The proposed SLI modernization project calls for the removal of both the CAS and Theory buildings. Provided that funding of the SLI project is forthcoming, it is likely that GPP projects and other deferred maintenance work for those buildings will not be necessary.

The only building that falls into the "Fail" category is the Off-Site Canal Pump house (Building P), which is 700 G.S.F. A deferred maintenance reduction plan has been prepared. The plan will be implemented over the next few years to reduce the deferred maintenance of the Pump house.

The total expected DM over the FY 2007 to FY 2018 period based on the management strategy, approach, and funding discussed above is essentially covered by the additional deferred maintenance reduction funding listed above and the GPP projects and budget listed in Attachment 3.

D.9 Recapitalization & Modernization

The *recapitalization rate* is the number of years it would take to regenerate the physical facilities, either through replacement or major renovation. The numerator of the formula is the plant replacement value of facilities that are intended for recapitalization (RPV). It represents assets that have a continuing mission (i.e., facilities that will not be disposed of and so will need to be replaced or renovated at some point). The denominator includes the annual recapitalization investment.

The Science Laboratory Infrastructure (SLI) Program represented an initiative by DOE to improve the condition of the DOE Laboratory infrastructure. During the first several years, there was emphasis on using this funding for the retirement or excessing of facilities. PPPL received approximately $1.0M of SLI funding in FY04. The subsequent discontinuation of SLI funding had resulted in a discontinuance of modernization of the PPPL infrastructure and the capital reinvestment strategy had since been limited, with a focus on maintaining the reliability and availability of the existing infrastructure. Recently, recapitalization of the existing infrastructure has been accomplished solely through funding from the General Plant Project Budget. Examples include the renovation of inactive areas of the CS Building in preparation for NCSX activities in that area. The "reclaiming" of areas in the RF Building allowed the relocation of Science Education and of HP CASL operations to the refurbished areas. The GPP program is dynamic in nature – new projects continue to be identified on a real-time basis. Attachment 3 illustrates a proposed GPP project plan; however, the actual project work plan is decided upon at the beginning of each fiscal year, depending upon priorities and resources existing at that time.

Fortunately, DOE-SC has realized that restoration of SLI funding is critical to the modernization of DOE Laboratory facilities and they recently announced a new Infrastructure Initiative (SLI II) that will restore SLI funding with the express purpose of facilities modernization. The SLI II initiative will greatly increase SC's line item construction funding and will allow PPPL to restore a progressive recapitalization and modernization program. PPPL has proposed two line item projects that have been scheduled for funding by SLI II. Those projects are discussed in detail in section D.9.b.

D.9.a IGPP (Not Applicable – this section is only applicable to multiprogram labs)

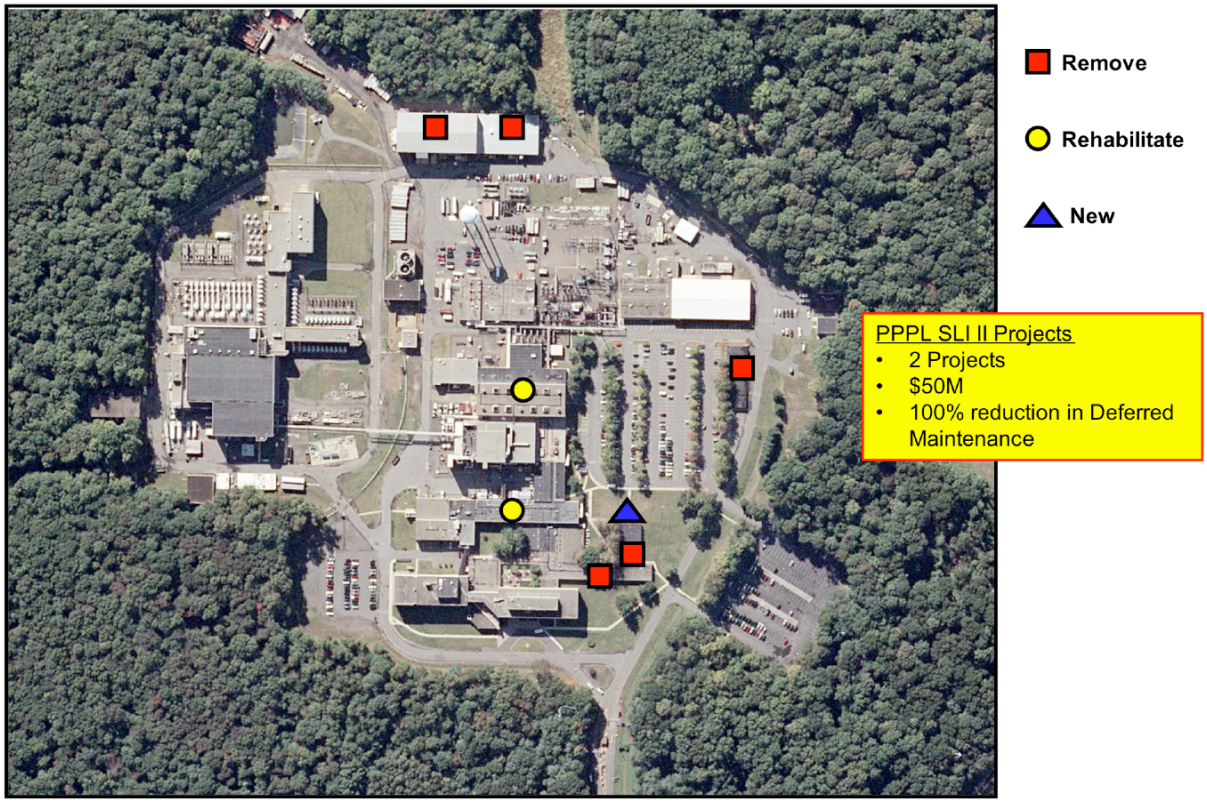
PPPL is a single program lab funded primarily by the DOE Office of Science. PPPL does not receive IGPP funding.

D.9.b Line Items (SLI Infrastructure Initiative)

PPPL has proposed two line item projects that will be funded by the DOE-SC SLI Infrastructure Initiative (SLI II). The projects, which are necessary to modernize F&I, are listed in Block 1.0 of the IFI Crosscut that is included as Attachment 3. This section includes additional detail of these projects including a short project description, square footage added or removed, square footage rehabbed and the expected reduction in deferred maintenance resulting from the projects. The RIC values in FIMS have been updated to reflect PPPL modernization plans, including

changes that will result from the SLI II line item projects. RIC costs are also included in Attachment 1.

PPPL Building Modernization Plan



The long-term goal[2] of the SLI II funding is for SC to have facilities and infrastructure that:

- Offer a safe, healthy, and secure work environment for employees and visitors;
- Are mission ready;
- Are efficient to operate and maintain, with a minimal deferred maintenance backlog.
- Are supported by a communications and information infrastructure that meets worker expectations for productivity and effective interaction with colleagues; and
- Provide a satisfactory work environment worthy of world-class scientific institutions and able to help attract and retain high quality scientific staff.

PPPL proposed two line item projects as candidates for funding within the SLI program. Both projects were selected for funding after being judged based on the following DOE-SC criteria:

1. The project is dedicated to core, general infrastructure needs, not primarily for the benefit of a single program or project. For example, electrical transformers dedicated to supply power to an accelerator or a supercomputer should not be funded by SLI.

[2] Office of Science Guidance for the 2007 Ten Year Site Plans, June 6, 2007 revision, page 11

2. The project should not be primarily focused on building capacity to handle new programmatic scope. The intent of SLI is to modernize SC's existing infrastructure, not to position an SC site for new missions.

3. The project cannot realistically be funded using non-SLI funding. For example, upgrades to high voltage lines can often be done by local utilities and paid for through electrical power rates.

4. The project is large in scope and beyond the reach of Institutional GPP. For example, upgrades to sidewalks, parking lots, roof repairs, etc., since they would typically be small enough to address with IGPP and could be done gradually over time without the need to maintain a large construction workforce, would not be expected to be candidates for SLI program funding

After being selected as appropriate projects for SLI funding, the projects were prioritized and scheduled for funding based on the following DOE-SC factors:

1. Mission relevance: The relevance of the project to DOE's missions and the scale of the investment being requested should be considered in determining the funding priority.

2. Footprint reduction: Projects that drive reductions in assets and building footprint through creativity, consolidation, and/or rehabilitation merit priority.

3. Return on investment: The project should have significant impact relative to return on investment, broadly defined. Return on investment should include things such as operational cost savings, increased productivity, sustainability, reduction in energy use, or ability to impact mission.

4. Deferred Maintenance: The impact on deferred maintenance should be a consideration in terms of funding priority.

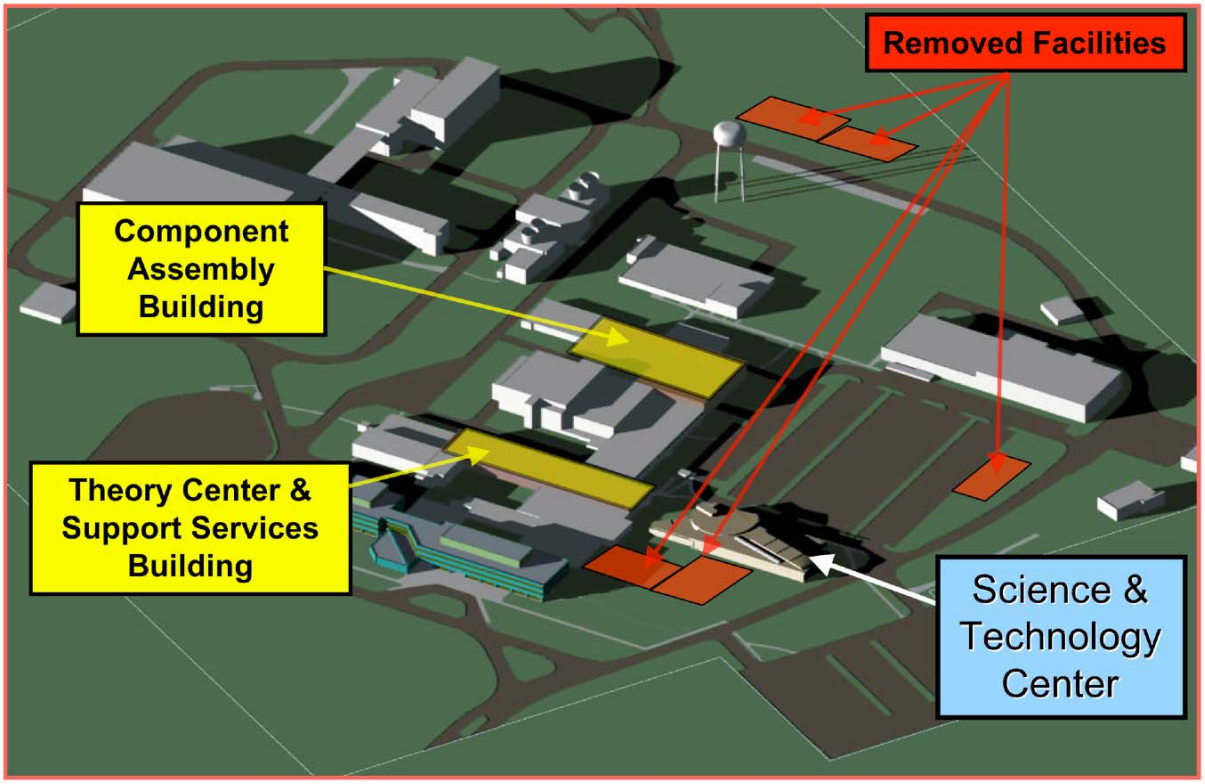
Overview of Proposed SLI II Line Item Projects

Two PPPL line item projects that were accepted for SLI funding were "Plasma Science & Technology Support Infrastructure" and "Critical Utility Infrastructure Systems Upgrade & Modernization."

"Plasma Science & Technology Support Infrastructure" This project will provide for the construction of a new, contemporary Science and Technology Center and the relocation of associated science and technology research from extremely outdated and inefficient 50 year-old facilities. This capability is important to the future of the U.S. fusion research program as it also serves to provide the setting for much of the undergraduate, graduate and postdoctoral research that will create future scientific program leaders.

This project will provide the added benefit of reducing building inventory and deferred maintenance -- once vacated, the 50 year-old Laboratory Building will be completely rehabilitated and modernized as a contemporary Theoretical and Support Services Building. The associated staff will be moved from three other deteriorating buildings (one of which is a modular facility) allowing for the demolition of these buildings and their removal from the PPPL inventory. The Project will also include the rehabilitation and conversion of the 50 year-old unutilized C-Site MG Building into a Component Assembly Facility and the removal of two additional buildings from the existing property inventory. A total of five buildings will be removed, which total 64,170 gross square feet.

Science & Technology Support Infrastructure Project



This project, which will cost $38 million dollars, will modernize nearly 20% of the entire Laboratory, while eliminating approximately 33% of the Deferred Maintenance backlog ($3.4M). The renovated facility will also reduce maintenance and operating costs. Annual energy consumption will be reduced by approximately $140k and maintenance costs will be reduced by $230k. The net total building area to be removed by this project is 31,170 gsf. and an additional 100,455 gsf will be rehabbed.

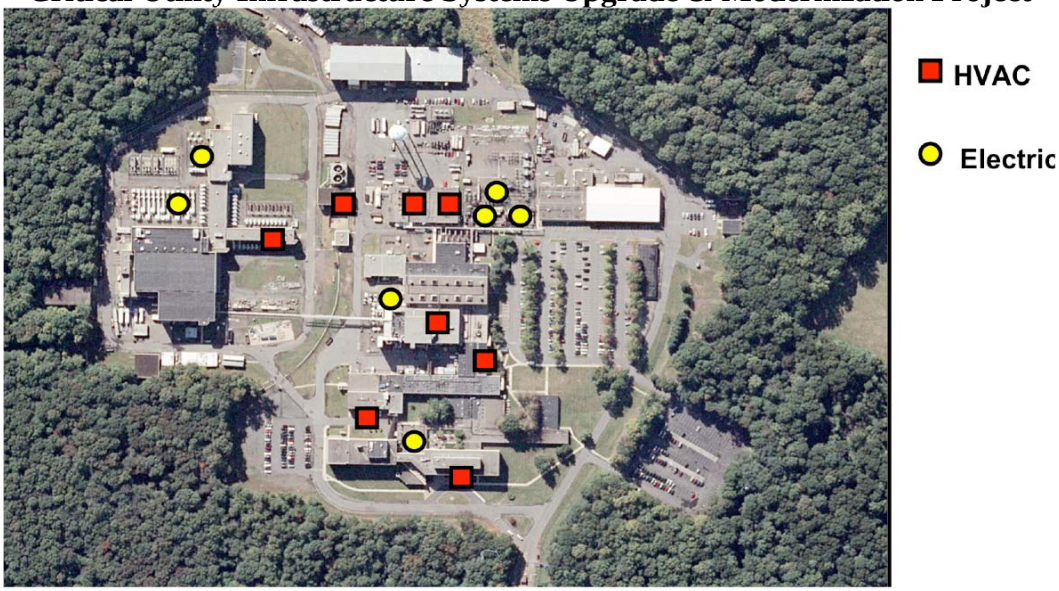
The project will begin in FY2010 funded by the DOE-SC SLI Infrastructure Initiative. The project funding profile is as follows:

FY2010	FY2011	FY2012	Total
$4,000,000	$18,000,000	$16,000,000	$38,000,000

"Critical Utility Infrastructure Systems Upgrade & Modernization."

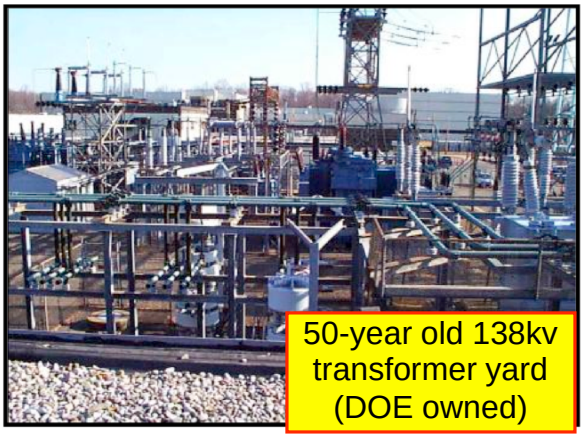
The completion of this project will serve two key purposes. First, it will refurbish and upgrade 30-50 year old critical components of the electrical power distribution system, thereby providing essential electrical services throughout the Laboratory in a reliable manner. Vulnerabilities associated with transformers, switchyards, and circuit breakers will be corrected. The project will also upgrade the Building Automation System for the purpose of maximizing energy efficiency and tie-in several key components and facilities to this system. Second, this project will upgrade and modernize HVAC, cooling water, steam, control systems and window assemblies in 10 critical areas at C-Site and D-Site, which have been deteriorating and threatening experimental operations.

Critical Utility Infrastructure Systems Upgrade & Modernization Project



This modernization project will reduce annual energy consumption by $65k and maintenance costs by $100k. Lastly, the project will eliminate $3.1M of Deferred Maintenance. The funding profile of this project is as follows:

FY2016	FY2017	FY2018	Total
$1,240,000	$6,684,000	$4,456,000	$12,380,000



D.9.c GPP

GPP projects are ranked by priority using the CAMP process and compete for funding. The comprehensive list of ranked GPP projects is contained in the Integrated Facilities and Infrastructure Crosscut Budget - Attachment 3.

PPPL's GPP budget was $1.80 million in FY07 and it was supplemented with an additional $900,000 of PPPL funds ($400,000 of this increase was enacted to accelerate a proposed FY08 project into FY07.) The GPP budget is expected to be $1.50 million in FY08. Ideally, the combination of GPP and GPE funding would total approximately 1% of Replacement Plant Value. This would allow for sustainment of the existing infrastructure without an increase in project backlog. The following list provides an example of some of the projects that have been completed or are in progress during FY2006 and 2007:

- C-Site Diesel Generator
- Upgrade CS Building High Bay Crane - Construction
- CS Building HVAC Upgrade
- CS Building Exterior Wall System Upgrade
- D-Site Fire Alarm Upgrade - Test Cells
- Upgrade LSB 1st Floor and Covered Walkway Roofing
- HVAC Upgrade to CAS/RESA Building
- Upgrade Administration / Administration Wing / Theory Roofing
- Upgrades to L245

In addition, the following projects are next in the queue to begin work during FY07 or FY08:

- Upgrade Steam & Condensate Utility Service
- Narrowband Paging System Conversion
- CS Building Control Room HVAC
- CS Building Test Cell Nitrogen Exhaust Ventilation System
- CS Building Control Room Ceiling, Lighting, & Convenience Outlets
- CS Building Fire Suppression System
- Upgrade RESA/CAS Roofing System
- Replace Elevated Water Tower Riser (Construction)

D.10 Site Space Bank Analysis

PPPL has 2,170 gsf of banked space as of the end of FY2006. The Health Physics CASL building (building 42) was demolished during FY06 and the facility was relocated to renovated areas in the RF building. PPPL has future plans to remove the Hazardous Materials Storage, Theory, Mod 6, Administration, CAS, and RESA buildings. The Hazardous Materials Storage operations will be relocated to the Radioactive Materials Handling Building. This is expected to be accomplished in approximately 3 years. The other buildings will be removed as part of a proposed SLI modernization project that is scheduled to begin in FY2010.

D.11 Performance Indicators and Measures

Performance measurement is a vital component of the PPPL management philosophy. Princeton University and the DOE have established a performance-based contract for the operation of the Princeton Plasma Physics Laboratory. This contract, which is in effect through September 30, 2007, includes important facilities-related performance measures. PPPL and the DOE Princeton Site Office evaluate and re-establish the performance measures annually by mutual agreement. The current performance measures apply to fiscal year 2007 (October 2006 through September 2007) are included in Appendix B of the Prime Contract. Metrics for the performance expectations are reported on a quarterly basis.

The overall goal for Infrastructure and Maintenance as stated in the Contract is to "Sustain excellence in operating, maintaining, and renewing the facility and infrastructure portfolio to meet laboratory needs"

The current agreed upon performance measures for FY2006 are summarized below.

Objective 7.1 Manage Facilities and Infrastructure in an Efficient and Effective Manner that Optimizes Usage and Minimizes Life Cycle Costs.

Measure 7.1.1: Maintenance of active conventional facilities against DOE corporate Maintenance investment goals. Maintenance Investment Index (MII) defined as total contractor funded maintenance for active conventional facilities divided by replacement value of these facilities.

Measure 7.1.2: Effective execution of the goals within the Energy Performance Management Agreement.

Measure 7.1.3: Infrastructure system reliability as measured by a Reliability Index. Total system reliability for electrical and building support systems.

Objective 7.2 Provide Planning for and Acquire the Facilities and Infrastructure Required to Support Future Laboratory Programs.

Measure 7.2.1: The Infrastructure Recapitalization Program shall expedite work in a timely fashion to meet the needs of the laboratory mission. Prior year carryover shall be 100% costed in the following fiscal year.

Measure 7.2.2: Recapitalization of active conventional facilities. Recapitalization Investment Index (RII) defined as total contractor budgeted GPP and Line Items for active conventional facilities divided by replacement value of these facilities.

Measure 7.2.3: Manage real property assets through performance based approaches to Real property life-cycle asset management (10 Year Site Plan). The Plan will be submitted to DOE on an annual basis (the target is based upon the DOE schedule used FY05. If the DOE schedule for FY06 changes, the targets should be adjusted accordingly.)

D.12 Energy and Sustainability Management

The Maintenance & Operations Division within the ES&H and Infrastructure Support Department is chartered with managing the PPPL In-House Energy Management Program. A Facilities Engineer is assigned to manage the various energy expense accounts and the M&O Division has established several goals and objectives directly related to efficient facility operations (including energy efficiency.) The PPPL In-House Energy Management (IHEM) Program includes providing appropriate control, organization, planning, and administration of all PPPL's relevant utility contracts, and providing direct liaison interfaces with all utility companies.

There are multiple utility accounts that principally include variations of electric and natural gas rate schedule accounts, fuel oil, propane gas, potable water, process (i.e. canal) water, and sewage water at the Laboratory. All utility invoices are technically and financially evaluated before approval for payment. This includes verifications of utility billing(s) included utility costs vs. rate schedules, utility usage, profiles, engineering/statistical analysis, and database maintenance.

PPPL's Performance Contract with the Department of Energy contains a specific incentivized performance measure that corresponds directly with federal goals. During FY06, PPPL achieved an adjectival rating of "A+" in accordance with established contractual performance metric for reduction of energy consumption. In addition, the Laboratory has implemented the requirements of the Energy Policy Act of 2005. Judging from baseline data of FY03 to FY06, in-house energy consumption was reduced by 26.47%. To date in FY07, in-house energy consumption is down by 32.8% from the FY03 baseline. In addition, the Laboratory has implemented the requirements of the Energy Policy Act of 2005.

The results demonstrate that PPPL has exceeded the DOE goals. The recent reductions in energy use were accomplished through the following efforts:

- Monitoring outside and indoor temperatures and reducing central plant steam pressures to as low as operationally possible.
- Strategically connecting large areas to the Building Automations System and using nighttime temperature set backs.
- Using the same systems start and stop time optimization programming. Essentially recording data on how a building reacts to temperature differentials inside and out and starting and stopping the buildings HVAC systems accordingly.
- Setting aside resources to replace and repair piping insulation. More than 600ft of steam, condensate or chill water insulation was replaced in FY06.
- Replacing old lighting with energy efficient lighting as part of ongoing renovations throughout the lab.
- Adding variable frequency drives to minimize motor and fan speed and energy consumption.
- Replacing old and failed electrical and mechanical equipment with more energy efficient models.
- Installing new R-14 siding over the existing R-1 transite exterior wall system of the CS building as part of a GPP project.

Ongoing sustainability practices also include:

- Using only recycled carpet and floor tiles.
- Replacing office furniture using manufacturers that offer recycled content products. (e.g., use of a Steel Case line that is made from 100% recycled material.)
- Recycling more that 50% of waste material.
- Using B-20 bio-diesel in all diesel powered maintenance vehicles.

Energy use reduction and sustainability projects planned for the upcoming year include:

- Replacing the controls on #4 Boiler. Boiler #4 is used 75% of the time that steam is required and this project is expected to reduce natural gas consumption in that boiler by 15%. Additionally, we will add a Flue Gas Return (FGR) system. The FGR system monitors the excess O_2 in the system and reduces NOX output.
- Continuing to expand the use of the Building Automation System.
- Re-insulating chilled water and piping as access to the areas and time permits.
- Replacing 300 feet of deteriorated underground steam and condensate piping as part of a GPP project.
- Upgrading 5 or 6 standard electric meters in FY08. (PPPL will have an Advanced Electric Metering Plan by the end of FY2007.)

Performance Measures	Baseline	Actual	Target				Achieve Target
	FY 2005*	FY 2006	FY 2007	FY 2008	FY 2009	Long Term	
Operating Costs - Energy Consumption (BTU/SF). 2005 Energy Policy Act. 20% reduction from 2003 baseline by 2015.	172,370	128,900	127,984	127,069	126,153	120,659	2006
Operating Costs - Energy Consumption (BTU/SF). EO 13423 3% annual reduction or 30% reduction by 2015.	172,370	128,900	127,984	127,069	126,153	120,659	2015

* FY 2003 Baseline per DOE-SC guidance.

D.13 Leasing & Third Party / Non-Federal Funded Construction of New Buildings

At this time, PPPL does not lease any space and has no plans for construction of non-federal funded buildings.

D.14 Operation Costs for Sustainment and Operations

In early 2007 PPPL began an initiative to improve the sustainability of Laboratory operations and improve environmental performance. *"Sustainable PPPL"* is a program that capitalizes on PPPL's existing Environmental Management System, energy management, environmentally preferred purchasing and facility operation program to reduce environmental impacts and improve performance. Sustainability efforts under this program have included:

- Replacement of toxic engine coolants with non-toxic products,
- Expanded use of bio-based oils, cutting fluids and cleaning products,
- Demonstration of a low-impact ice/snow melting product to replace traditional road salt,
- Specification of environmentally preferred office furnishings,
- Replacement of toxic solvent degreasers with non-hazardous and bio-based products,
- Building renovations using ultra-low VOC paints and recycled content carpeting,
- Installation of new high-efficiency lighting and energy management initiatives using PPPL's Building Automation System (BAS), and
- A pilot project using B-20 biodiesel fuel in all fleet trucks and non-highway vehicles.

Targets and goals for operating costs for buildings are shown in the table below. Operating costs for sustainment and DM reduction reflect the assumptions that RPVs will be increasing and that PPPL will continue to meet the 2% maintenance investment index goal.

Performance Measures ($/SF)	Baseline	Actual	Target				Achieve Target
	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Long Term	
Operating Costs-Sustainment and DM Reduction	$5.91	$7.13	$7.60	$8.26	$8.42	$9.53**	2015
Operating Costs - Operations* (includes grounds, janitorial, pest control, refuse, recycling and snow removal)	$1.31	$1.22	$1.44	$1.44***	$1.44	$1.44	2008

* Based on facilities operations costs and square footage from FIMS.
** At this level of spending, PPPL will meet and exceed an ACI of .98 for all buildings.
*** Escalation is not included beyond FY07.

PPPL will continue to proactively implement sustainability practices aimed at meeting, or exceeding, the environmental performance goals in its EMS, DOE Orders and Executive Orders.

E. Attachments

Attachment 1 Inventory of Buildings, Conditions, Square Feet and Utilization
Attachment 2 Site Map of C and D-Site Buildings
Attachment 3 Updated Integrated Facilities and Infrastructure (IFI) Crosscut Budget Submission
Attachment 4 Acronyms
Attachment 5 List of Excess Facilities (those officially excess and those in process and non-operational)

Attachment 1 Inventory of Buildings, Conditions, Square Feet and Utilization

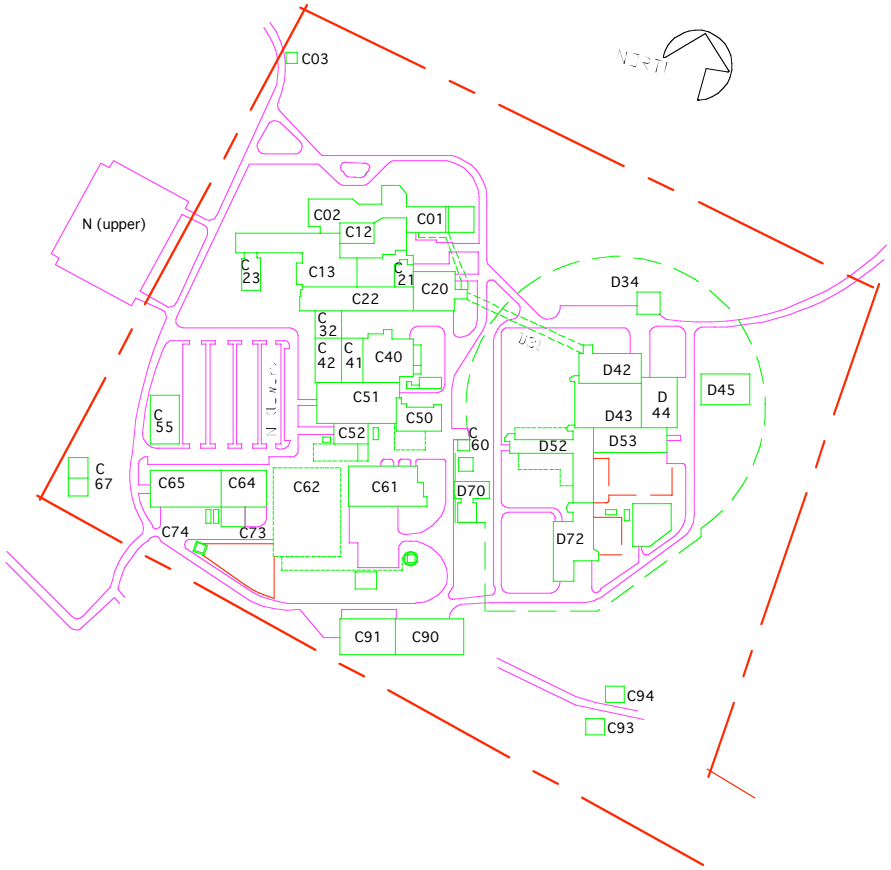
Verified February 2007

Bldg Name	Bldg No.	Gross Sq. Ft.	FY07 RPV as of Feb-07	FY06 DM	FCI	RIC	AUI	(=1-FCI) ACI
LSB	C01	111,943	$17,952,691.82	$829,161	4.62%	$0	1	0.95
Guardbooth	C03	164	$302,565.28	$23,491	7.76%	$0	1	0.92
Admin Wing/Cafeteria	C12	9,721	$1,963,015.18	$111,938	5.70%	$0	1	0.94
Admin Bldg/Library/Computer Add.	C13	25,743	$4,479,357.27	$383,339	8.56%	$7,025,712	1	0.91
Engineering Wing	C20	19,086	$3,321,019.81	$175,755	5.29%	$0	1	0.95
L-Wing	C21	4,114	$1,735,154.41	$216,620	12.48%	$0	1	0.88
Lab Bldg	C22	31,474	$11,995,924.53	$766,213	6.39%	$0	1	0.94
Theory	C23	5,267	$1,044,286.76	$322,544	30.89%	$2,937,383	1	0.69
Shop Bldg	C32	17,390	$5,157,638.90	$782,800	15.18%	$0	1	0.85
RF Bldg	C40	41,404	$10,332,150.89	$1,393,590	13.49%	$0	1	0.87
CS Bldg	C41	27,025	$6,782,979.40	$780,740	11.51%	$0	1	0.88
COB Bldg	C42	9,223	$1,655,011.23	$247,200	14.94%	$0	1	0.85
System Test Bldg	C50	8,346	$2,141,632.21	$71,070	3.32%	$0	1	0.97
C-Site MG Bldg	C51	64,857	$16,184,723.96	$375,950	2.32%	$0	0.8	0.98
PLT Power Bldg	C52	6,684	$743,202.54	$54,590	7.35%	$0	1	0.93
Mod 6 (ERWM)	C55	8,164	$1,464,980.13	$204,455	13.96%	$4,553,028	1	0.86
C-Site Tower/Pumphouse	C60	1,460	$30,000.00	$0	0.00%	$0	0	1.00
Facilities Bldg	C61	22,730	$6,741,411	$222,491	3.30%	$0	1	0.97
Warehouse Receiving 1	C64	13,083	$1,316,589.46	$65,139	4.95%	$0	1	0.95
Warehouse Receiving 3	C65	20,000	$2,012,672.10	$158,990	7.90%	$0	1	0.92
ESU Bldg	C67	7,694	$1,291,191.09	$53,659	4.16%	$0	1	0.96
Material Control Support Space	C73	2,351	$466,132.17	$14,364	3.08%	$0	1	0.97
Gas Cylinder Storage	C74	1,200	$133,429.54	$0	0.00%	$0	1	1.00
RESA Bldg	C90	20,750	$5,208,023.03	$599,763	11.52%	$9,650,277	1	0.88
CAS Bldg	C91	15,000	$1,509,504.08	$558,856	37.02%	$6,976,104	1	0.63
Hazmat Storage Bldg	C93	2,100	$233,501.69	$69,010	29.55%	$0	1	0.70
LEC Building (Liquid Effluent Collect)	D34	4,550	$1,324,325.75	$46,350	3.50%	$0	1	0.97
Rad Waste Handling Facility	D35	5,600	$1,481,926.72	$0	0.00%	$0	1	1.00
Experimental Area	D42	92,136	$68,812,401.63	$373,890	0.54%	$0	1	0.99
FCPC	D52	33,997	$7,745,604.71	$175,100	2.26%	$0	1	0.98
NBPC	D53	43,680	$13,555,006.55	$144,200	1.06%	$0	1	0.99
D-Site Cooling Tower/Pumphouse	D70	4,600	$1,338,878.78	$188,510	14.08%	$0	1	0.86
D-Site MG Bldg	D72	39,760	$13,466,249.09	$216,300	1.61%	$0	1	0.98
Off-Site (Rt. 1) Canal Pumphouse	P1	700	$225,117.46	$332,690	147.79 %	$0	1	-0.48
TOTALS...		721,996	$214,148,298.88	$9,958,767.33		$31,142,504		

AUI Range = 1.00 > 0.98 Excellent, 0.98 > 0.95 Good, 0.95 > 0.90 Adequate, 0.90 > 0.75 Fair and 0.75 > Poor
PPPL Overall AUI is .998 = Excellent

ACI Range = 1.00 > 0.98 Excellent, 0.98 > 0.95 Good, 0.95 > 0.90 Adequate, 0.90 > 0.75 Fair and 0.75 > Poor
PPPL Overall ACI is .964 = Good

NO.	DATE	REVISION	BY	CH	APPROVED	
	5/10/06	DELETED C33, REV. C60 PER ECN #5127	FJ	JN	JG	JS



C-SITE

C01 LSB East Wing
C02 LSB West Wing
C03 LSB Guard Booth
C12 Cafeteria/Admin Wing
C13 Administration Bulding - GPCC/Library
C20 Engineering Wing
C21 L Wing Addition
C22 Laboratory Building
C23 Theory Wing
C32 Shop Building
C40 RF Building
C41 CS Building
C42 COB Building
C50 Systems Test Building (Exper. Pwr./ESAT)
C51 MG Building
C52 PLT Power Building
C55 Modular Building 6
C60 Cooling Tower Pit
C61 Maintenance Building
C62 Switchyard
C64 Receiving #1
C65 Receiving #3
C67 Emergency Ser Bldg
C73 Material Control Support Facility
C74 Gas Cylinder Stor Bldg
C90 Research Equip Stor & Assy
C91 CAS Bldg
C93 Material Storage Bldg
C94 HP Cal Lab Mod 3

D-SITE

D31 TFTR-Control Room Tunnel
D34 LEC Building
D35 Rad Waste Facility
D42 Mock-Up Building
D43 TFTR Test Cell
D44 Hot Cell & NB Test Cell
D52 FCPC Building
D53 NBPC Building
D70 TFTR Cooling Tower Pump House
D72 TFTR MG Building
Parking lots refered to as lettered

CADDS DWG. TO MANUAL CHANGES ATTACHED
AUTOCAD 2002

PRINCETON PLASMA PHYSICS LABORATORY

C & D SITES

BUILDING FLOOR PLANS

"C"-SITE & "D"-SITE BUILDINGS

DR. [illegible]	LOCAL CAD NO.		[illegible]
DES. [illegible]	1BAD3002.DWG		D AD-300
CH. [illegible]	APPROVALS		
CHECKED	S.F.	C.A.P	J.S.	SHEET NO. 2

Integrated Facilities and Infrastructure Budget Data Sheet (IFI)	Project Number	Gross Building Area	FY 2007 Approp. ($000)	FY 2008 Approp ($000)	FY 2009 Budget ($000)	FY2010 Budget ($000)	FY 2011 Budget ($000)	FY 2012 Budget ($000)	FY 2013 Budget ($000)
SITE NAME: Princeton Plasma Physics Laboratory									
PROGRAM									
1.0 Capital Line Item (Include project number & identify Funding Program)									
1.1 New Construction (facilities and additions)									
Plasma Science & Technology Support Infrastructure						4,000	18,000	16,000	
1.2 All Other Projects (recap)									
Subtotal Line Item Projects			0	0	0	4,000	18,000	16,000	0
2.0 General Plant Project (GPP) (Include project number & identify Funding Program)									
2.1 New Construction (facilities and additions)			0	0	0	0	0	0	0
2.2 All Other Projects (recap)									
CS Building Whiting Crane Upgrade	G161		596						
CS Building Exterior Wall System	G164		499						
CS Building HVAC Upgrade	G166		160						
New Roofing System - Admin Bldg & Admin Wing	G169		389						
Upgrades to L245	G173		105						
Upgrade Steam & Condensate Utility Service	G172		52	90	208				
Narrowband Paging System Conversion	G167			405					
CS Building Control Room HVAC	Pending 1			114					
CS Building Test Cell Nitrogen Exhaust Ventilation System	Pending 2			152					
CS Building Control Room Ceiling, Lighting, & Conv Outlets	Pending 3			303					
CS Building Fire Suppression System	Pending 4			53					
Upgrade RESA/CAS Roofing System	Pending 5			420					
Replace Elevated Water Tower Riser (Construction)	Pending 6			363					
RF Building Exterior Wall System Upgrade	Pending 7				1,470				
Install New Wall Unit Heaters at Lab & Theory Wings	Pending 8				250				
D-Site Cooling Tower Upgrade	Pending 9				10	155			
Computer Center Drainage Improvements	Pending 10					30			
Cafeteria Upgrde	Pending 11					200			
Consolidation of Waste Management Operations	Pending 12					200			
C-Site Fire Alarm System Upgrade	Pending 13					761			
Upgrade VQT1 Transformer	Pending 14					350			
Substation Breakers	Pending 15					1,104	1,496		
L-Wing 1st Floor Electrical Distribution Upgrades	Pending 16						115		
L-Wing 2nd Floor Electrical Distribution Upgrades	Pending 17						290		
New Window Assemblies Admin Bldg, Lab & Admin Wings	Pending 18						340		
Replace CICADA Computer HVAC Units	Pending 19						150		
Replace PPLCC Central Computer HVAC Unit	Pending 20						140		
LSB Basement UPS for Computer Room & Control Stations	Pending 21						50		
C & D Site Roadway Improvements	Pending 22						200		
15KV & 4KV Circuit Breakers	Pending 23						94	306	
Upgrade Emergency Generator Controls	Pending 24							50	
Upgrade XQT1 Transformer	Pending 25							993	
C-Site HVAC Systems Upgrades	Pending 26							1,400	
D-Site HVAC Systems Upgrades	Pending 27							211	889
Replace HVAC Equipment (CFCs)	Pending 28								230
New Cooling Tower - Phase I	Pending 29								445
Modify Cafeteria Courtyard	Pending 30								80
138kV Switchyard Fire Protection Improvements	Pending 31								200
Additional Reserve Fuel Oil Tank for Central Plant	Pending 32								100

Upgrade Restroom Facilities	Pending 33								200
LSB Penthouse 480V Alternate Power Feed QPT1 to QPT2	Pending 34								100
Install Roll-Up Door in ESAT Building	Pending 35								100
Seismic Retrofit	Pending 36								250
CS Building Electrical Distribution System Upgrade	Pending 37								200
Fire Alarm Systems Upgrades	Pending 38								256
Subtotal GPP:			1,801	1,900	1,938	2,800	2,875	2,960	3,050
3.0 Institutional General Plant Project (IGPP)									
Subtotal IGPP Projects			0	0	0	0	0	0	0
4.0 Operating/Expense for Excess Elimination and Other									
4.1 Excess Elimination (demolition, sale, lease, transfer) Show area eliminated in Gross Area column									
4.1 Subtotal									
4.2 All Other (List direct O&E maintenance under 5.1)									
4.2 Subtotal									
Subtotal Operating/Expense Projects			0	0	0	0	0	0	0
TOTAL Capital & Operating Investment:			1,801	1,900	1,938	6,800	20,875	18,960	3,050
TOTAL Overhead Investments (IGPP)			0	0	0	0	0	0	0

NOTE: FY08 and FY09 Funding Guidance Numbers Are Below the 10 Year Plan Numbers Approved by DOE

Integrated Facilities and Infrastructure Budget Data Sheet (IFI)	Project Number	Gross Building Area	FY 2007 Approp. ($000)	FY 2008 Approp ($000)	FY 2009 Budget ($000)	FY2010 Budget ($000)	FY 2011 Budget ($000)	FY 2012 Budget ($000)	FY 2013 Budget ($000)
SITE NAME: Princeton Plasma Physics Laboratory									
PROGRAM:									
5.0 Maintenance & Repair									
5.1 Direct Funded (by HQ or Site Program)									
List direct O/E maintenance projects									
5.1._ Deferred Maintenance Reduction (Direct Funded)			6	0	0	0	0	0	0
Out year funding not provided in budget guidance									
Sub-Total Direct Maintenance & Repair			6	0	0	0	0	0	0
5.2 Indirect (from Overhead or Space Charges)									
Include indirect O/E maintenance projects in total			5089	5499	5636	5777	5922	6070	6222
5.2._ Deferred Maintenance Reduction (Indirect Funded)			0	0	0	0	0	0	0
Sub-Total Indirect Maintenance & Repair			5089	5499	5636	5777	5922	6070	6222
TOTAL Maintenance and Repair			5095	5499	5636	5777	5922	6070	6222
6.0 Indirect O&E Excess Elimination (demolition, sale, lease, transfer) Show area eliminated in Gross Area column									
CAS/RESA, Mod VI, Theory/Admin Demolitions		64,170							1,052
Total Indirect Excess Elimination		64,170	0	0	0	0	0	0	1,052

NOTE: Direct Funding For Deferred Maintenance Has Not Been Provided as Agreed

Integrated Facilities and Infrastructure Budget Data Sheet (IFI)	Project Number	FY 2007 Approp. ($000)	FY 2008 Approp ($000)	FY 2009 Budget ($000)	FY2010 Budget ($000)	FY 2011 Budget ($000)	FY 2012 Budget ($000)	FY 2013 Budget ($000)
SITE NAME: Princeton Plasma Physics Laboratory								
PROGRAM:								
7.0 Area of Excess Eliminated for all categories								
List of projects, by type of funding, with project number, and excess AREA eliminated by fiscal year accomplished.								
(CAS/RESA, Mod VI, Theory/Admin Demolition 64,170 gsf) **Line Item**								1,052
GPP								
IGPP								
Operations/Expense								
Indirect Operations/ Expense								
Transfer by sale or lease, or transfer to an outside federal agency								
Subtotal of Excess Facility Area Eliminated								1,052
Total Area to be Eliminated Each Year (Demolition, Sale or Transfer Completion Year)		0	0	0	0	0	0	64,170
Total Area to be Added by GPP, IGPP, and LI Construction (List Area Under Occupancy Year) (Science & Technology Center)		0	0	0	0	0	33,000	0

Attachment 4

Acronyms

ACI	Asset Condition Indices
AUI	Asset Utilization Index
BAS	Building Automation System
BHP	boiler horsepower
BTU	British Thermal Unit
CAMP	Capital Asset Management Process
CASL	Calibration and Service Laboratory
CCWP	Central Chilled Water Plant
CDX-U	Current Drive Experiment-Upgrade
CEA	Classification Exception Area
CY	Calendar Year
D&D	Decontamination and Decommissioning
DESC	Defense Energy Support Center
DM	Deferred Maintenance
DOE	Department of Energy
DOE-SC	Department of Energy off Office of Science
ES&H	Environment, Safety and Health
ES&H/IS	Environment, Safety and Health and Infrastructure Support Department
ESU	Emergency Services Unit
EVES	Emergency Voice Evacuation System
F&I	Facilities and Infrastructure
FCPC	Field Coil Power Conversion
FESAC	Fusion Energy Sciences Advisory Committee
FIMS	Facility Information Management System
FY	Fiscal Year
GPD	gallons per day
GPE	General Purpose Equipment
GPM	gallons per minute
GPP	General Plant Projects
HVAC	heating, ventilating and air conditioning
IFE	Inertial Fusion Energy
IFI	Integrated Facilities and Infrastructure
ISM	Integrated Safety Management
ITER	International Thermonuclear Experimental Reactor
kA	Kilo-amps
KSTAR	Korea Superconducting Tokamak Research Project
kW	Kilo-watts
kWh	Kilowatt-hour
LANL	Los Alamos National Laboratory
LECT	Liquid Effluent Collection Tanks
LLNL	Lawrence Livermore National Laboratory
LPDA	Laboratory Program Development Activities
LSB	Lyman Spitzer Building
LVG	Large Volume firm Gas
M&O	Maintenance & Operations Division
MFE	Magnetic Fusion Experiment
MG	motor-generator
MHD	magneto-hydrodynamic

MNX	Magnetic Nozzle Experiment
MOU	Memorandum of Understanding
MPI	Modernization Planning Indicator
MRX	Magnetic Reconnection Experiment
NASA	National Aeronautics and Space Administration
NBI	Neutral Beam Injection
NCSX	National Compact Stellarator Experiment
NEPA	National Environmental Policy Act
NERSC	National Energy Research Scientific Computing
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
NSST	Next Step Spherical Torus
NSTX	National Spherical Torus Experiment
OFES	Office of Fusion Energy Sciences (DOE)
ORNL	Oak Ridge National Laboratory
PBX-M	Princeton Beta Experiment-Modification
PEPCO	Potomac Energy Power Company
PPPL	Princeton Plasma Physics Laboratory
PSACI	Plasma Science Advanced Computing Institute
PSE&G	Public Service Electric and Gas
QA	Quasi-axisymmetry
QAS	quasi-axisymmetric stellarator
QO	Quasi-omniginous
QOS	Quasi-omniginous Stellarator
R&D	Research and development
RF	radio frequency
RI	remedial investigation
RIC	Rehab and Improvement Cost
RPAM	Real Property Asset Management
RPV	Replacement Value
SBRSA	Stony Brook Regional Sewage Authority
SC	Office of Science (DOE)
SciDAC	Scientific Discovery through Advanced Computing
SEAB	Secretary of Energy Advisory Board
SLI	Science Laboratory Infrastructure
SPCC	Spill Prevention Control and Countermeasure
sq. ft.	Square Feet
ST	Spherical Torus
TFTR	Tokamak Fusion Test Reactor
TRC	Technical Resources Committee
TSG	Transportation Service Gas
TYSP	Ten-Year Site Plan
UHF	Ultra high frequency
VOCs	volatile organic compounds

Attachment 5.

List of Excess Facilities (those officially excess and those in process and non-operational)

Excessed Buildings

Site Name	Prpty ID	*Excessed Buildings - Property Name*	G.S.F.	Excess Year
PPPL	C60	C-Site Pumphouse (Cooling Tower Demolished)	1,460	2004

Excessed Real Property Trailers

Site	RP Trailer Prpty ID	Real Prpty Trailers Prpty Name	GSF	Year

Excessed Other Structures and Facilities

Site Name	Prpty ID	OSF Prpty Name	Excess Yr.